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EDITORIAL NOTES.

14th INTERNATIONAL HORTICULTURAL CONGRESS

This will be held from 29 August to 6 September, 1955, at Scheveningen, The Netherlands. Your attention is drawn to the leaflet and card enclosed.

SALIENT ITEMS.

Twenty readers have commented on this new feature in writing and four or five others, no less emphatically, by word of mouth.

Of them only one is wholeheartedly against it. He does not believe in short cuts to knowledge and he considers that the young scientist will gain far more by a minute combing of each number than by an easy scamper through Salient Items. We could not agree more in theory, but in practice nowadays we have our doubts whether the minute combing is likely to occur.

Other more tolerant adverse comment is (1) our choice cannot be everybody's choice, and (2)—neatly put by one reader—"This new evaporation to dryness of the partially dehydrated material is going to mean it will be easier to pick out the things one wants, but possibly also easier to miss the other gems". The first argument is undoubtedly true, but surely as regards the second it is up to the reader not to miss the other gems: only the inveterate skimmer stands to lose.

Other commentators not only discussed Salient Items but also took us at our word and made suggestions for the improvement of *Horticultural Abstracts* in other ways: with these we hope to deal in December. Of Salient Items they approved on various grounds, including the following:—

1. The feature is particularly useful for the administrator, general advisory officer and the like.
2. It is useful as inducing a more catholic outlook in specialists who have hitherto tended to read only those parts which have concerned their special field.
3. It adds much needed spice to an essentially prosaic dish.

We propose, then, to continue in Salient Items to draw attention to developments which appear to be new and to papers which are related to one another but are necessarily separated in the abstracts. As regards spice we shall do our best, but would crave indulgence if from time to time it somewhat loses its pungency.

SALIENT ITEMS. Vol. 24. No. 3.

ANTIBIOTICS.

In plants:—Fundamental work at East Malling has thrown light on the mechanism by which host plants may control the level of pathogenicity of a fungus; in these experiments the aromatic fractions of apple and pear leaf extracts were found to exert a strongly inhibitory effect on *Venturia* scab organisms (2449). Similarly American work suggests that it may be a polyphenol present in the roots, which affords protection against *Fusarium* in non-susceptible tomato varieties (2826). Evidence has also been obtained in the United States, which suggests that soaking pea seeds in water results in the production of substances in the seed that are fungistatic to *Ascochyta pisi* (2698).

Antagonism between organisms:—In experiments in Israel *Bacillus subtilis* exerted inhibitory effects on cultures of 13 citrus fungus pathogens; the action generally was fungistatic but in one case fungicidal (3054). In American studies on soil micro-organisms antagonistic to *Pythium* root rot of sugar cane, the isolates of many genera, especially actinomycetes, were found to contain antibiotics which inhibited growth of the fungus (3236).

Control of bacterial diseases:—Encouraging results are reported on the use of antibiotics on an experimental scale to control various bacterial diseases of vegetables (2443, 2696, 2697) and on their use on a field scale against certain fruit tree pathogens, notably *Erwinia amylovora* (2441-2446). In one of these latter experiments (2441) the addition of indole-3-acetic acid to two antibiotics markedly increased the protection afforded. For the titles of two reviews on the use of antibiotics see 2545c and 2545u.

CHEMICAL ANALYSIS.

In the present number of *H.A.* there are papers on a rapid British method of determining N, P, and K (2143), a simple and rapid German method of determining nitrate (2136), another, to the uninitiated, much less simple German method of determining a series of elements (2135), a French method of determining vanillin (2872), and a simple method, used in Indonesia, of determining copper used in fungicide tests on tea (3259). Reference to the use of radio-active tracers in analytical studies on plant nutrients and systemic insecticides is made below. Seven other papers dealing with analytical procedures are mentioned by title only (2208f, k, n, r, s and 2209b, c).

CLIMATE AND WEATHER.

There is no lack of papers concerned with climatic factors.

Climatic cycles:—Records in part of Italy suggest that there are 16- and 32-year cycles in the production of grape vines which coincide with cycles of solar activity (2344). Similarly, records in Costa Rica indicate that part of the country is passing through a climatic phase favourable to the development of the coffee pathogen *Omphalia flavida* and that this phase may end in 1954 (3166). In Germany climatic conditions in the past decade have been generally favourable to reproduction of red spider mites (2488).

Long-range weather forecasting:—A knowledge of elementary arithmetic is all that is needed to make use of formulae worked out in East Africa, from which it is possible to calculate the proportion of years or seasons in which the rainfall is likely to fall below any given selected limit and also the pattern of rainfall likely to occur within particular growing seasons (2189); such information should be invaluable to a grower who is experiencing difficulty in deciding whether to spend his money on installing an irrigation system or on buying a new motor-car. A somewhat similar, if rather shorter-term, service may be rendered to fruitgrowers in Hampshire and perhaps other parts of England by the knowledge that the old country saying "March fog, May frost" is not mere superstition (2194).

Recording dew:—Three instruments are described, one recording the onset and duration of dew (2193), a second giving a continuous record of dew deposition by recording changes of weight of an exposed grass surface (2191), and a third recording the amount of water deposited on plant shoots by rain, dew or guttation and how long these surfaces remain wet (2192).

Frost injury and protection:—Several papers (2415-2422) are concerned with injuries suffered by fruit trees and other plants as the result of winter or spring frosts. Two others (2230, 2231) deal with the testing of apple varieties for hardiness, and the second of these shows that varieties found to be hardy in the autumn may become relatively tender as the winter advances, and *vice versa*. A Russian paper (2984) also suggests that trees of various species severely damaged by frost when young may develop frost resistance when older, and makes the additional claim that the progeny of such trees are usually hardier than their parents. The effects of defoliation and dormancy-inducing treatments on the susceptibility of forsythia are described from America (2998). Methods of protecting fruit trees and vines from frost or of mitigating the effects of injury are described in papers from several countries (2295, 2423-2426). Those who claim that their brussels sprouts are at their best only after a good sharp frost may have doubts after reading 2658.

Other climatic effects:—The need of deciduous fruits for a period of winter chilling is widely recognized, but it is interesting that the evergreen olive has also shown a similar need in California (3080). Other American papers deal with the effects of temperature on the development of apricot fruits (2222) and of sunshine and temperature on the keeping quality of apples (2223) and differences between leaf and air temperatures under freezing conditions (2793). In Austria both the histological and physiological condition of vine wood were found to be influenced by climate throughout the season (2362). Other papers deal with the rainfall requirements of the fig in Italy (2224), a chlorosis of vines resulting from lack of light and heat (2409), damage to fruit plants from hail (2427) and drought (2428), and the effect of atmospheric humidity on the flight and oviposition of the codling moth (2505).

Air movement in glasshouses:—It will come as something of a shock to people accustomed to think in terms of the expression "still air" to learn that if glasshouse tomatoes are to get enough CO_2 one complete change of air is needed every 6 minutes, and, further, that this is well below the normal ventilation rate which actually occurs in glasshouses (2799).

Atmospheric pollution:—Yet another gas, nitrogen dioxide, may be added to the list of noxious substances which may damage plants (2414) and thereby increase complications in the already complicated climatic picture.

Rain stimulation:—One more partially successful experiment on the seeding of clouds, this time over Madagascar, may be mentioned (2190).

MACHINERY AND EQUIPMENT.

Aeroplanes:—A general survey of the use of aircraft in agriculture in the U.S.A. will be of interest (2531). Experiences are also recorded on the use of an aeroplane to spray pecans in Florida (2532) and of a helicopter to spray vines in Switzerland (2530).

Machines and tools:—Descriptions are given of three sugar cane machines, a South African planter (3227) and a harvester (3230) and a loader (3229) developed in Australia. A tractor-mounted and -powered hoe designed on a new principle to hoe rows of small fruits, is described from Britain (2203) and a "scuffle hoe", which can be manœuvred under low branches, from America (2202). Also from America comes a formidable tractor-drawn pruning machine which will hedge rows of citrus at the rate of 1 acre per hour (3031). Machines developed for the destruction of weeds in canals and ditches are described in two papers (2554, 2555). Other equipment described includes an American power fumigator (2207), a razor-like instrument that has shown promise for plucking tea in Indonesia (3255), a suction pump and container used in France for harvesting jasmine flowers (3002), and a machine tested in Guatemala for removing the mucilage from coffee beans (3164).

Sprayers and spray deposits:—A small new sprayer is described from America which can be used to apply either dilute or concentrate sprays (2535). Less conventional are a centrally-operated high-pressure spraying installation covering many vineyards in Switzerland (2534) and a German rain gun, which at intervals ejects a fine mist of fungicidal spray (2475). The National Institute of Agricultural Engineering in England is responsible for four papers, one on spray nozzles (2201), two on a machine for counting spray deposit droplets (2536, 2537) and a fourth on methods of measuring small spray drops (2538).

Grading fruit:—Studies are reported from the United States on the mechanics involved in the visual inspection of produce for surface characteristics (2200).

Plastic and mastic:—Four papers are devoted to the use of plastics for propagation and other horticultural purposes (2204-2206, 2925). Another describes a new paste for glazing, which, unlike putty, maintains the same consistency in all weathers and can be applied with a syringe (2199).

Artificial light:—A promising new type of fluorescent tube for providing plants with artificial light is described from Belgium (2797, 2798).

NUTRITION.

Gone are those happy days when the experimenter merely applied varying amounts of N, P and/or K and based his recommendations on the results.

Some complex interrelationships:—New data are here provided on the interactions between major and minor elements and on the importance of obtaining the optimum balance between elements from the results of studies on apples (2266-2268), cherries (2273), citrus (2175), strawberries (2339), lettuce (2778), tung trees (3095-3097) and oil palms (3177). Studies on vegetable crops (2693, 2763, 2812, 2813) indicate that these element balances can be further disturbed by the presence of toxic quantities of metals such as nickel, cobalt and vanadium, which may or may not themselves be essential to plant growth (with regard to cobalt see 2140). Even when a balanced nutrient solution is applied the concentration supplied will affect growth responses and the accumulation of different elements (2269, 2273, 2640, 2948). The picture is further complicated by the influence of other factors. Thus, nitrogen has been shown to increase the transpiration of plants and so by inference affect their water relations (2184). When sycamore trees were grown in grass a deficiency of nitrogen resulted in reduced growth by the roots of the trees but at the same time increased elongation of the grass roots (2988). Finally mention may be made of an experiment on citrus in which day-length affected both the uptake and distribution of nutrients (3037).

Leaf composition and nutrient status:—It is hardly surprising that leaf analysis is not proving an entirely straightforward means of determining the nutrient status and requirements of plants. Thus in a paper on apples it is stated that commonly observed differences in leaf composition did not correspond with differences in the composition of the rest of the tree (2268). In other work on apples leaf composition was shown to vary with such factors as locality, on- and off-year seasons and tree age (2265, 2270, 2271) and also with the degree of compatibility between stocks and scions (2251). With citrus leaf composition was markedly influenced by rootstock (3034) and by the exposure of leaves to sunlight (3033).

Foliar nutrition:—Two papers are concerned with the responses of apples (2276, 2277), and one with the responses of tomatoes (2809) to urea sprays; in the last of these the addition of magnesium sulphate reduced both the absorption of the urea and the extent of leaf injury. Nitrogen, phosphorus and potassium were absorbed from nutrient sprays by several vegetables (2636). In vines a potassium sulphate spray cured potash deficiency (2410). The use of minor element sprays to correct deficiencies is referred to below.

Mineral deficiencies:—Mention may be made of an account of the increase in trace element deficiencies in South African orchards during the past 25 years (2399), and of papers describing deficiency symptoms in deciduous fruits (2400) and chrysanthemums (2940).

Boron:—Symptoms and treatment of boron deficiency are described for pears (2272, 2403), vines (2404), hops (2897), celery (2666) and tomatoes (2810), and of boron toxicity for pecans (2386). Stony pit of pears is not due to boron deficiency (2405).

Iron:—Investigations are reported on the relationship of the bicarbonate ion to lime-induced chlorosis in beans (2147) and on the effect of day-length and pH on the iron and phosphorus contents of citrus (3037). The results are reported of further trials with several chelated iron compounds to control iron deficiency chlorosis in various plants (2186, 2989, 3039). With iron deficient apples the injection of iron sulphate tablets effected a rapid cure in young, but not in old, trees (2406), and an iron sulphate solution also rapidly cured chlorosis in a lawn grass (2973). In studies on *Prunus* species iron stimulated pollen germination, whereas copper depressed it (2256).

Magnesium:—Magnesium figures prominently in the above studies. Four papers may also be mentioned here as dealing specifically with the symptoms and control of magnesium deficiency in apples (2250, 2407), peaches (2408) and tomatoes (2788).

Manganese:—One paper describes the symptoms and control of manganese deficiency in glasshouse roses (2980) and another the effects of cultural practices on the manganese status of soil and citrus trees under irrigation (3041).

Zinc:—The application of zinc sulphate corrected zinc deficiency symptoms in beans and increased yields even in cases where no symptoms were apparent (2694).

Salt tolerance:—The effect of concentrations of mixed salts on several deciduous fruits is described in one paper (2412) and of chlorides on strawberries and other plants in two others (2411, 2413).

RADIOACTIVE SUBSTANCES.

Radioactive nutrients:—Experiments in Hawaii with labelled elements applied to sugar cane have provided a picture of constant movement and mingling of solutes in the plant (3214). Temperature was shown to exert a considerable effect on the translocation of several labelled elements in a study on bean plants in Tennessee (2176). In Michigan the use of radioactive phosphorus has shown the ability of chrysanthemum leaves to absorb and translocate phosphorus (2939), while in Russia it has shown that the primary roots of broad beans absorb far more phosphorus than do lateral secondary roots (2178). Radioactive phosphorus has also been used in studies in South Africa on the excretion of phosphorus by leaves during rain (2181). The fact that radiation effects have been found to occur in England with P^{32} at relatively low tracer levels suggests, however, that this aspect requires further investigation (2177). Other tracer elements used in studies on the nutrition of plants are chlorine (2146), iron (2147) and zinc (3043).

Other uses of radioactive materials:—The use of tracer techniques in the study of systemic insecticides shows promise of assisting studies on the biochemical behaviour of these materials and also for routine analytical residue determinations (2523). Other papers describe the use of radioactive carbon in studies on photosynthesis (2154), of radioactive cobalt to induce mutations in deciduous fruits (2226), and of labelled 2,4-D in studies on the absorption and translocation of herbicides (2549).

Atomic radiation:—Conifers have been found much more sensitive to atomic radiation than have broad-leaved plants (2994).

STATISTICAL DESIGN AND ANALYSIS.

The statisticians are no longer hibernating. Note papers on methods for studying the spread of diseases in a plantation (2131), strawberry uniformity trials (2132), a method for determining the type of distribution of plant individuals in synthetic and natural populations (2133), a sampling procedure for grading tomatoes (2134), field plot techniques and analytical methods for use in weed control experiments (2553), and finally the use of boron to indicate the root spread of trees and thus provide a guide to spacing and the need for guard trees (2386).

MISCELLANEOUS.

Biochemical botany:—It is proposed to rename certain papaveraceous plants on the basis of the alkaloids contained (2876).

2,4-D as growth stimulator:—In California watering citrus seeds with a solution containing 2,4-D increased the percentage germination (3027) and adding 2,4-D to nutrient solutions increased the growth made by young avocado plants (3014) and by citrus seedlings (3028).

Economics:—Costs of growing apples in England are analysed in a report from Wye College (2218).

Flood damage recovery:—Early in 1953 both England and Holland experienced unprecedented sea water flooding. The extent to which Dutch farm lands have recovered is examined in a series of articles mentioned in abstract 2129.

The gardener's ally:—There are further reports on the use of maleic hydrazide to retard the growth of hedges (2985) and lawns (2972, 2974). In one of the latter (2972) it was used to check the growth of established turf while plugs of a better strain of grass were developing.

Graft-induced juvenility:—A Dutch paper describing the behaviour of grafts between the juvenile and adult forms of ivy indicates that the leaves of the former play a part in the rejuvenating effect exerted by the juvenile upon the adult components of the graft (2174).

Iodine:—Iodine solutions applied to vegetable and flower crops not only induced growth responses but protected the plants from attacks by diseases and nematodes (2182, 2643). Iodized wraps decreased mould attacks on stored fruits of several species, though with stone fruits they caused abnormal ripening (2383).

Not-so-bright seed packets:—Coloured seed packets may brighten shop windows but volatile toxins emanating from the dyes used may sometimes upset the viability of the seeds inside (2633).

Oxygen pills:—A nutrient tablet giving off oxygen during its decomposition is now available in Germany for use in hydroponic cultures (2929).

Pollination and sprays:—Certain common fungicides and insecticides have been found in Colombia to inhibit germination of cacao pollen (3129, 3130), and in France to kill or reduce the growth rate of pollen from *Prunus* species (2256).

Vegetative hybridization:—In Russia tomato plants injected with juice of *Solanum nigrum* showed negligible morphological change, but plants raised from their seeds differed markedly from their parents (2794).

Weed control conference:—Weed control studies seem abnormally inducive of conferences. Yet one more country, this time Britain, has organized a get-together of this type (2547).

MISCELLANEOUS.

General.

(*See also* 3273, 3275, 3276, 3280, 3282, 3288, 3296, 3301, 3302, 3304, 3305, 3306, 3308, 3309, 3315, 3316, 3322, 3323j.)

2120. Viney, R.
Horticultural production on Gisborne plains.
N.Z. J. Agric., 1953, **87**: 547-54, bibl. 1, illus.

The Gisborne district is ideally suited to horticulture and could become one of the main sources of supply of fruit and vegetables in New Zealand. Notes are given on present production of vegetables, sub-tropical fruit, including avocado and citrus, and temperate fruit.

2121. Rebour, H.
L'Institut de Recherches et d'Essais Frigorifiques Louis Morard à Birmandreis (Algér).
(The Louis Morard Cold Storage Research Institute at Birmandreis, Algeria.)
Fruits et Prim., 1953, **23** : 450-3, illus.

Designed for tests on a semi-industrial scale, the Institute has cold rooms operating on the radiation and ventilation systems at 0 to +4° C. and at −10 to +25° C. Gas storage tests can be made. The building of the Institute was completed in 1951/52, but the laboratories are not yet fully equipped.

2122. U.S. Department of Agriculture.
Directory of Activities of the Bureau of Plant Industry, Soils and Agricultural Engineering 1952, being *Agriculture Handbook* **47,** Supt. Documents, U.S. Govt Printing Office, Washington 25, D.C., pp. 131, 40 cents.

The Bureau conducts research on crops, soil, machinery, storage, transport, and housing problems of farming and gardening. Most of this work is done in co-operation with State agricultural experiment stations. A brief account is given of the research in progress under the Bureau's auspices in the United States and its overseas territories, and in Latin America.

2123. Ministry of Agriculture, B.C.
The Fraser Valley of British Columbia, Canada.
Agric. Settlem. Ser. Circ. **5,** 1953, pp. 19, illus., 2 maps.

The area is approximately 700,000 acres, of which 320,000 are under cultivation. Horticulture is becoming important, among the chief crops being forced rhubarb, strawberries and other small fruits, high bush blueberries and cranberries. Top fruits are not generally grown commercially. Filberts are grown with success, also tobacco and hops. There are some 2,000,000 square feet of glass used for tomatoes, cucumbers and ornamentals. Bulbs are increasing in importance. Vegetables are grown for the Vancouver and Prairie markets, as also increasingly for canning and freezing. Some vegetable and flower seed is produced.

2124. Shah, S. M. I.
The fruit industry and its scope in Pakistan.
Agric. Pakistan, 1952, 3: 1-5.

Pakistan affords excellent opportunities for growing all sorts of fruits suited to different climatic, moisture and soil conditions. In West Pakistan apple, peach, pear, plum, citrus and mango can be grown to perfection and in East Pakistan pineapple, papaw, mango and banana. Schemes are being developed in the provinces for introducing, selecting and distributing different fruits and for standardizing optimum cultivation methods. Lines of possible development are discussed. The chief fruits according to the latest available figures cover the following acreages: mango 93,000, banana 87,000, coconut 42,000, citrus 35,000, melon and watermelon 28,000, guava 7,000, date palm 6,500, vines 4,600, pineapple 4,400, pear, peach, apricot and plum each 2,000–3,000, almond and apple between 1,000 and 2,000 acres each. The areas of their distribution in the North-West Frontier Province, Punjab, Sind and East Bengal are given.

2125. Glonti, M. D., and Matinjan, A. B.
The Batum botanic garden. [Russian.]
Priroda, 1954, **43** (2): 54-60, illus.

A description is given of the garden founded in 1912 on the shores of the Black Sea, 9 km. from Batum. Its 109 ha. are divided into 9 phyto-geographical parts of which the Far Eastern section contains the widest selection of plants. Notes are given on scientific investigations in progress, on results obtained to date in acclimatization and on the behaviour of certain plants.

2126. Maunder, A. H.
Improvement of agricultural extension services in European countries.
FAO Dev. Pap. **41 Agric.**, 1954, pp. 69, $0.75 or 3s. 9d.

Methods, qualifications of officers and progress are all considered.

2127. Fossum, M. T.
Economic trends in horticulture.
Amer. Nurserym., 1954, **99** (7): 9, 60-1.

The information given here, to be included in an official U.S. Department of Agriculture publication, shows that total wholesale business in ornamental horticultural produce more than trebled between 1940 and 1952. Apparent trends have been the increasing importance of production of ornamental woody plants and the decline in fruit and nut trees and small fruit plants.

2128. Anon.
Registro de variedades de plantas: legislación. (**Register of plant varieties: legislation.**)
Publ. Inst. Invest. agron. Madrid, 1953, pp. 30.

This publication consists of copies of legislation concerning the Register of Plant Varieties established in 1947 under the Instituto Nacional de Investigaciones Agronómicas of Madrid and the regulations governing its management.

2129. van den Berg, C., and others.
Schade en herstel in de watersnoodgebieden. (**Damage and recovery in the flooded areas.**) [English summaries.]
Meded. Dir. Tuinb., 1954, **17**: 249-88, illus., maps.

Several articles by government advisory officers, a year after the floods, show that recovery has been rapid in many parts. Many of the polders were quickly drained, and with the heavy rainfall of Aug./Sept. 1953 and Jan./Feb. 1954 much of the salt deposited in the soils was washed out. Polders which had been inundated for a long time present a more serious problem, as the fertile soil is overlaid by a thick sand layer; nearly all the fruit orchards in Zeeland have been lost as a result of the flooding. Maps are given of the duration of flooding of the polders, the salt content of the soils immediately after drainage and a survey of top fruits in the flood area on 1 January, 1954. The serious effect of flooding on implements, brick and iron structures and heating installations is discussed.

2130. Kaltofen, H.
Hydrokultur und landwirtschaftlicher Pflanzenbau. (**Water culture and crop production.**)
Z. Acker-u. PflBau, 1953, **97**: 213-20, from abstr. in *Soils and Ferts*, 1954, **17**, No. 682.

Pot experiments with white mustard as test plant showed a greater efficiency of both fertilizers and water when supplied in the form of fertilizer solutions than when the fertilizer was applied separately, both being applied in amounts equal to those used for the solutions. Fertilizer solutions appear to provide a more evenly distributed concentration of nutrients in the soil and an adequate nutrient and water supply throughout the season, and thus seem to be of particular interest for quality production on sandy soils of inferior quality.

Statistical design and analysis.

2131. Freeman, G. H.
Spread of diseases in a rectangular plantation with vacancies.
Biometrika, 1953, **40**: 287-96.

In the past various methods have been suggested for studying the method of spread of a disease by considering its distribution among trees, etc., planted in some geometric arrangement. In this paper statistical tests are given for studying dispersion in a rectangular planting system from the point of view both of changes with time and of distribution at any one time, the latter tests considering separately the cases of spread (*a*) along the rows only, (*b*) along rows and at right angles to them but not along diagonals and (*c*) along diagonals as well. The tests are not vitiated by some plants being missing. S.C.P.

2132. Baker, G. A., and Baker, R. E.
Strawberry uniformity yield trials.
Biometrics, 1953, **9**: 412-21.

Individual plant yields in a particular year are presented for two uniformity trials of strawberries in California of 200 and 500 plants respectively. Various sizes and arrangements of plots are imposed and a hundred sample F-values are calculated for each by assigning "varieties" to plots at random. The sample means and variances of the F-values are tabulated alongside the theoretical means and variances. The conclusion is drawn that some plot arrangements are better than others. In particular two Latin square arrangements appear to find significant differences oftener than would be expected. [In the abstractor's opinion the results are not conclusive.] When real varietal differences are imposed on certain of the plot arrangements there is an indication that such differences are less easily detectable than would be expected. The correlation between yields of neighbouring plants was very low. G.M.J.

2133. Hopkins, B., and Skellam, J. G.
A method for determining the type of distribution of plant individuals.
Ann. Bot. Lond., 1954, **18**: 213-27, bibl. 17.

The method depends on linear measurements between random points and adjacent individuals, and between adjacent pairs of individuals. Its results compare favourably with those of the current methods when tested on synthetic or natural populations. The method is quicker than the quadrat methods and is especially useful for analysing the distribution of trees. [Authors' abstract.]

2134. Kramer, A., Ogle, W. L., and Clarke, B. W.
Sample procedure for grading tomatoes.
Food Tech., 1953, **7**: 353-5, from abstr. in *Food Sci. Abstr.*, 1954, **26**, No. 887.

Loads of tomatoes for processing were sampled by taking numbers of tomatoes varying from 50 from each of 2 baskets to 1 from each of 100 baskets. A statistical analysis of the results showed that the greatest efficiency of sampling, calculated from time taken and sampling error, was obtained by taking 10 tomatoes from each of 10 baskets. The calculations are applicable to other products packed in baskets, crates, cartons, etc., rather than in bulk.

Biochemistry.

(*See also* 2208f, h, n, p, r, s, 2209c.)

2135. Kick, H.
Flammenphotometrische Messungen mittels eines Monochromators in Verbindung mit einem Sekundär-Elektronenverstärker mit Photokathode. **(Flame photometry with a monochromator and photomultiplier.)**
Z. PflErnähr. Düng., 1953, **60**: 163-7, bibl. 4.

The method described makes it possible to determine consecutively Na, K, Ca, Ba, Li, Sn and Mn in the acetylene flame in the absence of any significant interference. 30 p.p.m. of Ca gives a deflection of 10 mm.—Landw. Hochschule, Hohenheim.

2136. Balks, R., and Reekers, I.
Zur Methodik der Nitratbestimmung in Pflanzensubstanz. **(A method of nitrate determination in plant material.)**
Landw. Forsch., 1954, **6**: 121-6, bibl. 2.

A simple, rapid and reliable method is described for the microchemical determination of the nitrate content of plant material with the aid of 1-2-4-xylenol.—Landw. Versuchsanst., Darmstadt.

2137. Bundesanstalt für Qualitätsforschung, Geisenheim.
Untersuchungsergebnisse über exogene Aminosäuren (Biologische Wertigkeit) in pflanzlichen Erzeugnissen. **(Studies on exogenous amino-acids (nutritional value) in plant products.)**
A.R. Bundesanst. Qualitätsforsch. pflanzl. Erzeugn. Geisenheim, 1953/54, 1954, pp. 19-20.

In a study of vegetables and cereals as sources of protein leaves of brussels sprouts and kale (*Brassica oleracea* var. *acephala*) were found to have the highest essential-amino-acid-(EAA-) indexes of 79 and 75 respectively. In addition, these vegetables have a high mineral and vitamin A, B, and C content so that their nutritional value is outstanding. In manurial trials the EAA-index of lettuce was shown to increase as a result of nitrogen manuring.

2138. Warington, K.
The influence of iron supply on toxic effects of manganese, molybdenum and vanadium on soybean, peas and flax.
Ann. appl. Biol., 1954, **41**: 1-21, bibl. 26, illus.

Investigations were carried out at Rothamsted on crops grown in nutrient solutions with iron supplied as ferric citrate and nitrogen as nitrate. The addition of V to iron-chlorotic plants caused toxic symptoms. Increased supplies of Fe counteracted the toxicity of Mn, Mo and V, a few relatively large doses being more effective than small successive doses in the case of Mo and V, but not Mn. When chlorosis had been reduced, increased iron reduced the Mn and V contents of the shoots but the Mo content was only reduced when high concentrations of Mn were present. High concentrations of Mn, Mo and V reduced the iron content of the shoots. Yield data indicated a reaction between Mn and both Mo and V when the iron supply was low but not between Mo and V. J.S.

2139. Strain, H. H.
Leaf xanthophylls: the action of acids on violaxanthin, violeoxanthin, taraxanthin and tareoxanthin.
Arch. Biochem. Biophys., 1954, **48**: 458-68, bibl. 6.

Chromatographic comparisons, spectral properties, and reactions with acid indicate that the violaxanthin of leaves is identical with the violaxanthin of pansies. These results support the view than violaxanthin is the second most abundant xanthophyll of leaves. In all, eight pigments with spectral properties similar to those of flavoxanthin have been isolated from the products formed by the action of acids on violaxanthin, violeoxanthin, taraxanthin, and tareoxanthin. [From author's summary.]—Carnegie Inst., Stanford, Calif.

2140. Miller, C. O.
The influence of cobalt and sugars upon the elongation of etiolated pea stem segments.
Plant Physiol., 1954, **29**: 79-82, bibl. 8.

Sugar consistently caused an increase of cell volume, but its effect on elongation was variable. Co promoted elongation slightly. The combination of Co and sugar gave greatly increased elongation of pea stem segments. There is, therefore, a distinction between the roles of water uptake and cell wall increase in plant cell enlargement; probably sucrose increases the cell volume and Co promotes the increase of surface area in cell walls.

2141. Pratt, H. K.
Direct chemical proof of ethylene production by detached leaves.
Plant Physiol., 1954, **29**: 16-18, bibl. 15.

Ethylene was identified as a product of detached leaves of milk thistle (*Silybum marianum*) by an apparatus which is fully described.

2142. Steward, F. C., and others.
A quantitative chromatographic study of nitrogenous components of shoot apices.
Amer. J. Bot., 1954, **41**: 123-34, bibl. 21, illus.

Studies were made on *Lupinus albus*, *Syringa vulgaris* and *Adiantum pedatum* to estimate by chromatography the occurrence of amino-acids and amides present in apical and mature tissue. The general characteristics of the protein fraction of the growing regions include a high content of arginine and lysine, and a tendency towards a greater ratio of glutamic to aspartic acid, than in the protein of more mature regions.

2143. Cavell, A. J.
A rapid method for the determination of nitrogen, phosphorus and potassium in plant materials.
J. Sci. Food Agric., 1954, **5**: 195-200, bibl. 17.

A rapid method for determining nitrogen, phosphorus and potassium has been developed: after the plant material is digested with sulphuric acid, nitrogen is estimated as ammonia, phosphorus as the yellow phosphovanadomolybdate and potassium with a flame photometer. [Author's abstract.]—N.A.A.S.

2144. Seifter, E.
The occurrence and role of coenzyme A in plants.
Diss. Abstr., 1953, **13**: 647-8, being *Publ.* 5623 of 70 pp.

Coenzyme A was found to be present in many flowering plants, generally in high concentration in the seeds and in rather lower concentration in the leaves. Its role in the oxidation of pyruvate was studied.

2145. Robinson, E., and Brown, R.
Enzyme changes in relation to cell growth in excised root tissues.
J. exp. Bot., 1954, **5**: 71-8, bibl. 5.

Serial sections 1·0 mm. in length taken from the tip towards the base of the bean root were cultured on 2% sucrose. Determinations of length, invertase, phosphatase and protein content of the sections were made. Alterations in the enzyme complement of the sections were related to growth and protein content. [From authors' summary.]

2146. Toth, S. J., and Kretschmer, A. E.
Plant studies with radioactive chlorine.
Soil Sci., 1954, **77**: 293-302, bibl. 9, illus.

By measuring the Cl^{36} activity of ashed plant parts, a method was developed to determine the relative concentrations of Cl^{36} in plant tissues. In tomatoes the highest content was found in the stem and petiole portion below the lowest fruit cluster. In lima beans the highest content of Cl^{36} was found in the main pulvini; the Cl^{36} content of bean seeds was related to the degree of maturity, the less mature containing the most Cl^{36}. Tomato plants absorbed and translocated Cl^{36} applied to the leaves.

2147. Lindsay, W. L., and Thorne, D. W.
Bicarbonate ion and oxygen level as related to chlorosis.
Soil Sci., 1954, **77**: 271-9, bibl. 16.

Soil studies were made to determine the possible relationship of bicarbonate ion to lime-induced chlorosis. Aeration studies were made by growing Great North bean plants in nutrient solutions in the greenhouse, in order to determine the effect of bicarbonate ion, oxygen tension and iron source on chlorosis. Soil solutions from chlorotic areas had a higher concentration of bicarbonate and calcium ions than those from adjacent green areas; applications of gypsum or sulphur to calcareous soils increased soluble Ca and Mg, and suppressed the bicarbonate ion, in soil solution, at depths greater than 12 in. The bicarbonate ion reduced the movement of radio-iron into the leaves and stems, and accentuated its accumulation in the roots. Chlorosis in bicarbonate-treated cultures increased at high oxygen levels, and was accompanied by reduced movement of Fe to the leaves, lower chlorophyll content and reduced growth. Iron sequestrene was only a slightly more efficient source of Fe to bean plants in solution cultures at pH 7·8 than was soluble phosphate. [From authors' summary.]

2148. Gäumann, E., and others.
Über die Wirkung von Pyramidon auf pflanzliche Zellen. **(The action of Pyramidon on plant cells.)**
Phytopath. Z., 1954, **21**: 279-310, bibl. 16.

It was hoped that Pyramidon, a well-known antipyretic, might reduce the permeability of plant cells and thus have an action antagonistic to wilting toxins. This hope was not fulfilled, but a study was made of the effect of Pyramidon on the water balance of tomato shoots and on the exudation of anthocyanin from beetroot tissue.—Eidg. Tech. Hochschule, Zürich.

Growth substances.

(*See also* 2208g, k, m, z, 2209b, 2225, 2243, 2284, 2286-2296, 2379-2381, 2441, Section on Weeds and weed control, 2695, 2754, 2784, 2801-2804, 2974, 2985, 3005, 3014, 3027, 3047, 3048, 3069, 3070, 3079, 3118, 3133, 3182, 3190.)

2149. Hamner, C. L., Rebstock, T. L., and Sell, H. M.
The growth regulating properties of some β-naphthylalanines.
Science, 1954, **119**: 217-18, bibl. 5, illus.

Data are tabulated on the effect of various β-naphthylalanines upon the root growth and the respiratory quotient of germinating cucumber seeds.

2150. Cooke, A. R.
The relation of plant growth hormones to photoperiodism.
Diss. Abstr., 1953, **13**: 641-2, being *Publ.* 5656 of 90 pp.

The relationship between auxin content and flower initiation was studied. There was shown to be a decrease in auxin content in both long-day and short-day plants at the time of the appearance of flower primordia, but lowering the auxin content by various methods did not bring about flower initiation under unfavourable photoperiods.

2151. Sequeira, L., and Steeves, T. A.
Auxin inactivation and its relation to leaf drop caused by the fungus *Omphalia flavida*.
Plant Physiol., 1954, **29**: 11-16, bibl. 17, illus.

Omphalia flavida causes severe premature defoliation in coffee and coleus; leaf drop is often the result of a single lesion at the base of the blade or on the petiole. Comparable mechanical injury does not result in a similar leaf abscission. Abscission of coleus leaves can be delayed by applying IAA to the petiole below the lesion. *O. flavida* inactivates IAA in its culture medium; the auxin-inactivating substance is thought to be an oxidative enzyme, but probably not peroxidase or polyphenol oxidase. This enzyme is responsible for the main pathogenic effect of *Omphalia flavida*.

2152. HOWELL, R. W.
The inhibiting effect of root tips on the elongation of excised *Pisum* epicotyls cultured *in vitro*.
Plant Physiol., 1954, **29**: 100-2, bibl. 5.

The elongation of excised epicotyls of Alaska peas in sterile culture is inhibited by root tips placed on the surface of agar medium, or by extracts from the tips added to the nutrient medium. The concentration of the inhibitor is highest in the terminal cm. of the roots and decreases in amount with distance from the tip. Root formation is also inhibited on the epicotyls.

2153. GREULACH, V. A., AND HAESLOOP, J. G.
Some effects of maleic hydrazide on internode elongation, cell enlargement, and stem anatomy.
Amer. J. Bot., 1954, **41**: 44-50, bibl. 16, illus.

Maleic hydrazide inhibited the elongation of the younger internodes of Tennessee Bush beans, and tomatoes var. Break o' Day. In tomato the inhibition was due to suppression of cell division.

2154. NEWBURGH, R. W., AND BURRIS, R. H.
Effect of inhibitors on the photosynthetic fixation of carbon dioxide.
Arch. Biochem. Biophys., 1954, **49**: 98-109, bibl. 16, illus.

In experiments with *Nicotiana tabacum*, variety Comstock Spanish, it was found that certain inhibitors alter the distribution of C^{14} in stable non-volatile compounds formed by photosynthetic reduction of $C^{14}O_2$. Dinitrophenol, phenylurethan, and iodoacetamide decrease the percentage of C^{14} found in phosphoglyceric acid. Dinitrophenol and phenylurethan enhance the formation of alanine relative to other compounds. Pyruvic acid 2-C^{14} infiltrated into a leaf yields alanine with the carbon chain unaltered and glycine whose carboxyl group arises from carbon atom 2 of pyruvate. [Authors' summary.]

2155. GREENHAM, C. G.
Phosphonic acids as auxins and substances affecting growth.
Aust. J. Sci., 1953, **16**: 66-7, bibl. 8.

Ethyl 2,4-dichlorophenoxymethane phosphonate showed auxin properties in the split pea and pea epicotyl tests.

2156. BAKHUIZEN, H. L. VAN DE SANDE.
Flowering and flowering hormones (One single scheme for both long-day and short-day plants). III. Photoperiodism in short-day plants.
Repr. from *Proc. Kon. ned. Akad. Wetensch. Ser. C*, 1953, **56**: 164-83, bibl. 17.

Short-day plants are assumed to be those in which, after ripeness to flower is reached, the ratio of the hourly production of substances formed in the dark to that of those formed in the light lies between 1·0 and 2·0. The chief deductions from this premise are: (1) short-day plants require consecutive light and dark periods of a certain length in each cycle; (2) flowering hormone is formed only in the dark; (3) the optimal length of photoperiod corresponds to the optimal amount of flowering hormone necessary for flowering; (4) the different behaviour of long- and short-day plants with regard to completion of photoperiodic induction processes interrupted by cycles of inadequate day lengths could be explained by the facts that in the former there is a continuous flow of flower-forming substances while in the latter flower-forming substances formed in the photoinductive cycles alternate with leaf-forming substances formed in the non-photoinductive cycles.

2157. LEOPOLD, A. C., AND GUERNSEY, F. S.
Auxin polarity in the *Coleus* plant.
Bot. Gaz., 1953, **115**: 147-54, bibl. 20, illus.

The transport of auxin in stems and roots of *Coleus blumei* was studied, using the pea-root test to estimate auxin concentrations. Polar gradients exist in the *Coleus* plant, ranging from basipetal polarity in the vegetative stem apex to the opposite polarity in the root-tip. Flowering stems do not have a strict basipetal polarity, but are capable of transporting auxin acropetally as well; this may be caused by one or more diffusible substances in the flowering apex. Phototropism experiments are reported which demonstrate that intact flowering stems transport the phototropic response acropetally and that vegetative stems lack this capacity.

2158. FLAIG, W.
Beziehung zwischen Dehydrasewirkung von Modellsubstanzen von Huminsäurevorstufen und dem Wurzelwachstum. **(The relationship between the dehydrase action of model substances of humic acid precursors and root growth.)**
Landw. Forsch., 1953, Sonderheft **4**, pp. 72-7, bibl. 17.

Studying the role of several quinones as dehydrases in the oxidative deamination of amino acids, the author found a certain relationship to exist between action and chemical constitution of the quinones. In the course of the investigation it was shown that heteroauxin is formed from tryptophane. At present it must remain an open question to what extent these results support the claim that the application of small amounts of β-indolylacetic acid increases plant yields. [Translation of author's summary.]

2159. LAUENSTEIN, A.
Mitteilung über die Wirkung von Glycosiden auf das Pflanzenwachstum. **(Communication on the action of glucosides on plant growth.)**
Arch. Gartenb., 1953, **1**: 416-20, bibl. 3.

Earlier claims by Fahrenkamp that seed treatment with glucosides from *Digitalis* and *Convallaria* had a favourable effect on plant growth were not substantiated, the difference between treated plants and controls not being significant. The experiments were carried out with cucumber, melon and lettuce.—Inst. Gartenb. Dresden-Pillnitz.

Light effects.

(*See also* 2150, 2156, 2208 l, q, 2776, 2797, 2798, 2961, 2964.)

2160. Liverman, J. L., and Bonner, J.
Biochemistry of the photoperiodic response. The high-intensity-light reaction.
Bot. Gaz., 1953, **115**: 121-8, bibl. 14.

Results of experiments on *Xanthium pennsylvanicum*, a short-day plant, show that 1% sucrose applied to a mature leaf can by-pass the high-intensity-light period required by this plant for photoperiodic induction. 1% sucrose applied through the basal ends of cuttings was also capable of replacing the high-intensity-light effect. Glucose, galactose, citrate and malate gave the same response when substituted for sucrose.

2161. Yemm, E. W., and Willis, A. J.
Chlorophyll and photosynthesis in stomatal guard cells.
Nature, 1954, **173**: 726, bibl. 5.

Observations made on *Rumex patientia*, *Chrysanthemum maximum* and *Vicia faba* show that their stomatal guard cells contain chlorophyll. Evidence suggests that photosynthesis takes place in these guard cells.—Univ. Bristol.

2162. Hiller, W.
Der Einfluss von Strahlungsquellen auf die Keimung einiger im Zierpflanzenbau kultivierter Lichtkeimer. **(The influence of source of radiation on the germination of some ornamental plants which germinate in the light.)**
Arch. Gartenb., 1953, **1**: 428-68, bibl. 86.

Mercury vapour lamps, infra-red radiation and low-pressure mercury gas discharge tubes [Lumineszenzröhen] emitting spectra of 400–800 mμ were used to study the effect of source of light on the germination of gloxinia. The detailed data presented show that generally intensity and time of illumination or wave length have little influence on germination. Small-scale tests with *Begonia semperflorens* and *Primula obconica* yielded similar results.—Humboldt-Univ., Berlin.

2163. Moškov, B. S.
Periodic alternations of light and dark and the rhythm of leaf movement. [Russian.]
Agrobiologija, 1953, No. 4, pp. 125-9, illus.

In trials in Leningrad with *Mimosa pudica* given artificial light for periods varying from 12 to 24 hours it was observed that the plants were photosensitive from the earliest seedling stage. About 7–8 days after the appearance of the first true leaf the leaflets folded even before the onset of darkness and opened before illumination was restarted. Plants given 21 hours light folded their leaves about 1 hour before the onset of darkness, those given 12 hours only 10–15 min. before darkness. This rhythm of leaf movement in plants grown for a month or more under regularly alternating light and dark was maintained for 2–3 days after the light treatment was changed. The source of light was also shown to affect leaf movement; blue-violet radiation caused a faster expansion of leaves than yellow-green or red-orange radiations. Mimosas grown under 21-hour light treatment produced the greatest weight of plant material and those grown under 12 hours the smallest. Earliest flowering was induced by a 17-hour light period. Uninterrupted illumination, resulting in absence of leaf movement, also caused early flowering, but the plants were weak and the leaves soon turned yellow and dropped.

2164. van Emden, J. H., and Laoh, J. P.
Een methode om de dichtheid van schaduw te meten. **(A method of measuring shade density.)** [English summary 3 pp.]
Arch. Theecult., 1953, **18**: 223-37, bibl. 3.

The interception of solar radiation by varying densities of shade trees was measured by the oxalic acid method of measuring the intensity of daylight.

2165. Laibach, F., and Zenker, A.
Zur Kältebeeinflussung der Blütenbildung bei Langtagpflanzen. **(The effect of chilling on flower formation in long-day plants.)**
Planta, 1954, **43**: 250-2, bibl. 2.

The results of experiments with *Arabidopsis thaliana* and *Arabis hirsuta* are briefly discussed. A full account of the study by the junior author is to appear in *Beitr. Biol. Pfl.*

2166. Lawrence, W. J. C., and Calvert, A.
Natural illumination in three-quarter span greenhouses.
Gdnrs' Chron., 1954, **135**: 92-3.

Comparison of growth in lettuces on the north bench of a three-quarter span house, transmitting north light in one case and reflecting south light in the other, shows that reflection of south light does not compensate for exclusion of north light. In two experiments the difference in favour of north light was 14% and 23% in early and late autumn respectively. [From authors' summary.]

Plant respiration.

2167. Gibbs, M.
The respiration of the pea plant. Oxidation of hexose phosphate and pentose phosphate by cell-free extracts of pea leaves.
Plant Physiol., 1954, **29**: 34-9, bibl. 24.

Cell-free extracts of 11- to 15-day pea leaves oxidise fructose-1, 6-diphosphate, fructose-6-phosphate, glucose-6-phosphate, 6-phosphogluconate, ribose-5-phosphate in the presence of triphosphopyridine nucleotide. The oxidation of glucose-6-phosphate, 6-phosphogluconate and ribose-5-phosphate indicates the presence in leaf tissue of a "hexosemonophosphate shunt", which closely resembles that found in animal tissue and yeast. [From author's summary.]

2168. Eberhardt, F.
Über die Beziehungen zwischen Atmung und Anthocyansynthese. **(On the relation between respiration and anthocyanin synthesis.)**
Planta, 1954, **43**: 253-87, bibl. 35.

A relationship between high respiratory activity and anthocyanin synthesis was found to exist in red cabbage seedlings, in the autumn-coloured leaves of *Saxifraga* *crassifolia* and *Parthenocissus vitacea* and in elderberries.—Univ. Tübingen.

Propagation.

(*See also* 2204, 2206, 2239-2253, 2632-2634, 2744, 2925-2927, 3004.)

2169. Stoutemyer, V. T., and Close, A. W.
Propagation by seedage and grafting under fluorescent lamps.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 459-65, bibl. 6.

In trials conducted at Glenn Dale, Md, in 1946, on a number of vegetable and flower seedlings raised under artificial illumination provided for 16 hours daily by twin 40-watt fluorescent lamps, tomato was the most exacting plant as to the colour of light. Only one combination, a blue tube plus a 3500°K white, produced plants comparable with those raised in daylight. A similar experiment with grafted stocks of evergreens illuminated by double 40-watt 3500°K white tubes resulted in satisfactory growth and excellent root development.

2170. Creech, J. L. (Editor).
Vegetative propagation.
Nat. hort. Mag., 1954, Vol. **33**, No. 1, 88 pp.

This valuable issue is entirely devoted to vegetative propagation, with illustrated articles by well-known authorities on every aspect of such propagation, mostly of ornamental plants.

2171. Klas, Z.
Studien über den Fervoreffekt bei pflanzlichen Organismen. I. Komparative Untersuchungen der Einwirkung des fervorisierten Wassers auf das Auskeimen von verschiedenen Pflanzensamen. II. Komparative Untersuchungen der Einwirkung des thermalen und des fervorisierten Wassers auf das Auskeimen von Senfsamen. III. Komparative Untersuchungen der Einwirkung des fervorisierten und glazialisierten Wassers auf das Auskeimen von Senfsamen. **(Studies on the effect of super-heating on plants. I. The effect of super-heated water on the germination of certain plant seeds. II. The effect of thermal and super-heated water on the germination of mustard seed. III. The effect of super-heated and icy water on the germination of mustard seed.)**
Abstracts in *Bull. Sci. Cons. Acad. Yugosl.*, 1953, **1**: 57-8.

Super-heating implies the repeated exposure of a medium or of water to a temperature of 137° C. under a pressure of 2½ atmospheres for periods of 1 hour per treatment. I. In preliminary tests with 22 species, super-heated, distilled water and super-heated Zagreb tap water were shown to have a stimulating effect on seed germination which was statistically significant. II and III. Water from a thermal spring and very cold water obtained by melting ice also stimulated the germination of mustard seed.—Inst. exp. Biol., Akad. Zagreb.

2172. Rappaport, J.
***In vitro* culture of plant embryos and factors controlling their growth.**
Bot. Rev., 1954, **20**: 201-25, bibl. 17.

A review of the literature on this subject up to February 1953, covering the use of inorganic and organic substances as nutrient media, and the physical factors involved.

2173. Poljakoff-Mayber, A.
Germination inhibitors and plant enzyme systems. III. Hydrolytic enzymes.
Palest. J. Bot. (*J*), 1953, **6**: 101-6, bibl. 7.

Coumarin was shown to inhibit the activity of protease in the early stages of germinating lettuce seeds; protease formation in germinating seeds was not affected.

2174. Doorenbos, J.
"Rejuvenation" of *Hedera helix* in graft combinations.
Repr. from *Proc. Kon. ned. Akad. Wetensch.*, *Ser. C*, 1954, **57**: 99-102, bibl. 5, illus.

The juvenile form of ivy, *Hedera helix*, was grafted onto the adult form, and *vice versa*. Under the influence of the juvenile grafting partner the adult form in many cases lost the capacity to flower and on its new growth showed juvenile characters in varying degree. From defoliation experiments it appeared that this "rejuvenation" was stimulated by leaves of the juvenile form, and inhibited by leaves of the adult form. [Author's summary.]

Nutrition.

(*See also* 2208e, 3290.)

2175. Welch, H. V., Jr., Wallace, A., and Mueller, R. T.
Influence of factorially combined levels of cations and nitrate ions adsorbed on ion-exchange resins on the nutrient absorption by plants.
Proc. Soil Sci. Soc. Amer., 1954, **18**: 137-40, bibl. 19.

The interaction of different levels of cations and nitrate N adsorbed on synthetic exchange resins upon nutrient absorption by plants was studied in a pot experiment, using lemon cuttings and a mixed sowing of oats and radishes. A factorial design of 3 levels of cations and 3 of N was used, Ca, Mg, and K being supplied in the same ratio at all levels, and P and S being unvaried. The adsorbed ions were an excellent nutrient source for the plants. Yields were limited in the oat and radish crop by both N and cation levels, K being the limiting cation. Ca and Mg absorption was depressed as the cation level increased as a result of increased K uptake. Increasing N levels resulted in increased N and in an increased total anion uptake, but also in depressed P and S uptake. The level of adsorbed N did not appear to influence the cation content in lemon and radish. The level of cations did not appear to influence the N or the m.e. sum of anions in the plants, beyond the differences caused by yield variations. Increases in N tended to result in increased K and Mg contents in lemon cuttings. At all cation levels for radishes, increases in N tended to result in decreased K.

2176. Swanson, C. A., and Whitney, J. B., Jr.
Studies on the translocation of foliar-applied P^{32} and other radioisotopes in bean plants.
Amer. J. Bot., 1953, **40**: 816-23, bibl. 15, illus.

The influence of petiole temperature on the rate of distribution of foliar-applied P^{32}, K^{42}, Ca^{45}, and Cs^{137} was studied. Marked inhibition of translocation by low petiole temperature was observed amounting to 85% or more at a temperature of about 5° C. The optimal temperature for 4-hr translocation periods was usually near 30° C., higher temperatures causing a decline. Temperature also exerted a direct and marked effect on the amount of radioisotope accumulated in the temperature-treated petiole itself, the optimum temperature being higher than for translocation, usually above 40° C. Localized low temperatures on the stem were also found to retard markedly the translocation of foliar-applied P^{32} to portions of the plant below the temperature zone. Low stem temperatures, on the other hand, did not retard upward movement of P^{32} through the stems when the radioisotope was supplied via the roots. Killing a 5-mm. zone on the petiole by steaming completely stopped the outward movement of P^{32}, K^{42} and Cs^{137} from the leaf. Experiments employing simultaneous applications to the leaves of $P^{32}+K^{42}$, and $P^{32}+Cs^{137}$, indicated independent and different rates of movement in the phloem. [Authors' summary.]—Univ. Tennessee, Oak Ridge.

2177. Bould, C., Nicholas, D. J. D., and Thomas, W. D. E.
Radiation effects with radioactive phosphorus in barley and tomato grown in soil.
Plant and Soil, 1953, **5**: 36-53, bibl. 17.

In factorial experiments with barley and tomato grown in pots, it was shown that radiation effects with P^{32} occurred, though only infrequently, at relatively low tracer levels. The effects are not great enough to preclude the use of P^{32} in nutrition experiments, but it is essential to discover to what extent they do occur in any such experiments. [See also *H.A.*, 21: 1301.]

2178. Kolosov, I. I.
The use of radioactive phosphorus P^{32} for the study of the role of separate roots and parts of root system in the nutrition of plants.
[Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1954, No. 1, pp. 95-109, bibl. 24.

In the experiments described wheat was the major test plant, but it was also shown that the primary roots of broad beans absorbed much more P than did the lateral secondary roots. The P content of whole broad bean plants provided with P^{32} through the primary roots only was about 10 times as high as in plants provided with P^{32} through the lateral roots only.

2179. Williams, B. C.
Observations on intercellular canals in root tips with special reference to the Compositae.
Amer. J. Bot., 1954, **41**: 104-6, bibl. 6, illus.

The intercellular canals found in meristematic root tips of Compositae species were investigated; their function may be to aid the sieve tubes in the transport of organic nutrient material into the root tip.

2180. Jacob, A., Wiegand, K., and Hallbauer, E.
Bor-Düngemittel mit wasserunlöslichem Bor. **(Boron fertilizers containing water-insoluble boron.)**
Landw. Forschung, 1954, **6**: 10-12, bibl. 6.

The water-insoluble compound colemanite ($Ca_2B_6O_{11}.5H_2O$) has its advantages where injury to susceptible seedling plants from excessive B is to be avoided.

2181. Mes, M. G.
Excretion (recretion) of phosphorus and other mineral elements by leaves under the influence of rain.
S. Afr. J. Sci., 1954, **50**: 167-72, bibl. 11.

Radioactive phosphorus was fed to the roots of tobacco, tomato, potato, bean, pea and maize plants. After a few days the plants were subjected to artificial rain and the leaves and the rain water collected were analysed to determine the amount of phosphorus present in each. It was found that appreciable amounts of phosphorus, and also of other elements, may be given off by the leaves depending on the type of plant and on the climatic conditions. Previous high transpiration rates seem to favour excretion. Plants protected from rain contained up to 25% more ash than plants subjected to rain. [Author's abstract.]—Plant Physiol. Res. Inst. Univ. Pretoria.

2182. Holman, J. C. M.
Iodine for earlier and healthier crops.
Grower, 1954, **41**: 533.

Trials were carried out by the Chilean Iodine Educational Bureau in Dorset and Hampshire in 1953 to determine the value of iodine for crop plants. In experiments with lettuce, Lugol's solution (iodine 50 g., potassium iodide 100 g., distilled water 1,000 ml.) at a concentration of 1 teaspoonful to 2 gal. water was applied to the seedbed before sowing and to the field before planting out at the rate of 1 gal. solution per sq. yd. The treated plants grew more rapidly than the controls and were completely free from damping off. When the iodine solution was applied as an overhead spray at 2-weekly intervals from sowing until planting out, the treated plants were free from botrytis and immune from eelworm attack which seriously affected the controls. Tomato seedbeds were sprayed with 1 tablespoonful Lugol's solution in 2 gal. water prior to sowing and the plants sprayed with the more dilute solution at 2-weekly intervals from the cotyledon stage until the formation of the second truss. Treated plants grew more rapidly and sturdily than the controls, and cropped 2 weeks earlier. They were free from *Cladosporium fulvum* and mosaic which attacked the control plants. Similar trials with cucumbers and melons also resulted in stronger and more rapidly growing plants and earlier yields. Antirrhinums treated with iodine solution were free from disease.

2183. Arvan, P. G., and Mowry, D. T.
Water soluble plant food formulations.
Agric. Chemls, 1954, **9** (3): 47-9, 137-9.

Data are tabulated on the analysis of 20 solid and 6 liquid fertilizer formulations for the home garden, most of them enjoying nation-wide distribution in the U.S.A.

2184. Biebl, R.
Die Wirkung verschiedener Stickstoffdünger auf die Transpiration einiger Kulturpflanzen. (**The effect of nitrogen fertilizers on the transpiration of some cultivated plants.**)
Z. PflErnähr. Düng., 1952, **59**: 60-75, bibl. 12.

Plants receiving nitrogen had thicker main roots and more secondary and lateral roots than the controls. N-plants always showed a higher rate of transpiration and often a continuous rise of the transpiration curve over the midday period, while the controls considerably reduced their water loss by closing their stomata. It must be assumed that the open stomata of the treated plants had a beneficial effect on photosynthetic activity. Peas and broad beans were among the experimental plants.—Pflanzenphysiol. Inst., Univ. Wien.

2185. Penningsfeld, F., Fast, G., and Schneble, K.
Knochenmehl oder Hyperphos? (**Bone meal or "Hyperphos"?**)
Gartenwelt, 1954, **54**: 145-8, illus.

The action of a crude phosphate of African origin, marketed as Hyperphos and containing 25–29% phosphoric acid plus 12–15% calcium carbonate, has been tested in comparison with bone meal. On the basis of 3 years' trials Hyperphos is recommended as a cheap, slow-acting source of P for the long-term culture of vegetables and ornamentals on acid soils.—Weihenstephan.

2186. Wallace, A., and others.
Chelating agents as a means of supplying micronutrients to woody plants in alkaline and calcareous soils.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 116-18, bibl. 5.

In field and laboratory work soil treatments with EDTA, DTPA and HEEDTA, combined with iron, have caused 18 species of young chlorotic plants in alkaline and calcareous soils to become green. The DTPA and HEEDTA complexes with iron appeared more stable in calcareous soils than EDTA. [See also *H.A.*, 24: 708.]

Soil treatment.

(*See also* 3279.)

2187. Bunt, A. C.
Steam pressure in soil sterilization. 1. In bins.
J. hort. Sci., 1954, **29**: 89-97, bibl. 4.

These experiments at the John Innes Institution showed that quantity of steam alone is the determining factor in efficient sterilization of soil in bins, and that it is most economical to use low pressure boilers and fit steam mains of adequate size. The system should be arranged so that all the loam can be heated within 15 minutes. The correct moisture content of a medium loam for sterilization is 25–30% of oven dry weight, and the steam pressure required to raise the temperature of this loam from 54° F. to 212° F. is 6 lb. per cubic foot.

2188. Wang, M. Y.
Effect of lignin on soil properties and plant growth.
Diss. Abstr., 1953, **13**: 620, being *Publ.* 5938 of 70 pp.

Lignin prepared by saccharification of corncobs improved the physical, chemical and biological properties of soils with which it was mixed. In a greenhouse experiment it increased tomato yields, especially when nitrogen, mulch and lime were also applied. Mixed with the soil at the optimum rate of 5 tons per acre, lignin was better than corncobs or sawdust; as a mulch it was better than sawdust.

Rain, dew and frost.

2189. Glover, J., and Robinson, P.
A simple method of calculating the reliability of rainfall.
Robinson, P., and Glover, J.
The reliability of rainfall within the growing season.
E. Afr. agric. J., 1953, **19**: 11-13, bibl. 1; and 1954, **19**: 137-9.

In the first paper a simple mathematical formula is described by means of which it is possible to determine, from average rainfall figures, the proportion of years or seasons in which the rainfall is likely to fall below any given selected limit. The second paper describes an extension of this method for use in calculating the pattern of rainfall likely to occur within a particular growing season.

2190. Anon.
Les essais de pluie artificielle en Androy. (Aôut-Septembre 1953.) (**The rain-inducing experiments in Androy. August-September 1953.**)
Bull. Madagascar, 1954, No. 94, pp. 267-72, maps.

At Androy on the south coast of Madagascar cumulus clouds accompanying cold coming from the sea in the dry season (July-October) can give abundant natural rainfall, but very often they give little or none and deposit their moisture farther inland. An account is given of the experimental seeding of clouds from aircraft with an unspecified salt in August-September 1953. Some success was achieved and it was concluded that appropriate action under moderately cold conditions might give an increase of 4–10 mm. rain in southern Androy, but that a significant increase in northern Androy could only be induced in the presence of considerable cold such as develops only twice or thrice each cool season. A previous article on this subject was published in No. 86 of the journal.

2191. Jennings, E. G., and Monteith, J. L.
A sensitive recording dew-balance.
Quart. J. roy. met. Soc., 1954, **80**: 222-6, bibl. 6, illus.

The instrument described gives a continuous record on photographic paper of the change in weight of a naturally exposed grass surface. Observations suggest that on very calm nights the condensation of vapour reaching the surface by diffusion from the atmosphere is only a small fraction of the total "dew". [From authors' summary.]—Imperial College, London.

2192. Hirst, J. M.
A method for recording the formation and persistence of water deposits on plant shoots.
Quart. J. roy. met. Soc., 1954, **80**: 227-31, bibl. 4, illus.

Apparatus has been designed to record the amount of water deposited on plant shoots by rain, dew and guttation, and how long the surfaces remain wet. These factors greatly influence the extent to which plants are infected by fungi. [From author's summary.] —Rothamsted Exp. Stat.

2193. Wallin, J. R., and Polhemus, D. N.
A dew recorder.
Science, 1954, **119**: 294-5, illus.

A description is given from Ames, Iowa, of an instrument which records the onset and duration of dew deposition.

2194. Lawrence, E. N.
The chances of late spring frost in 1954.
Weather, 1954, **9**: 113-16, bibl. 3.

Analysis of meteorological records kept at South Farnborough, Hants, England, for 25 years support local weather lore in showing a highly significant correlation between the frequency of March fogs and that of May frosts based on grass temperatures below 32° F. A negative correlation between May frosts and March plus April rainfall suggests that a relationship exists between the occurrence of ground frost and moisture status of the soil. This may explain why records obtained at East Malling [*H.A.*, 18: 2541], in which temperatures were recorded 4 ft. above the ground in a Stevenson screen, failed to show a relationship between March fogs and May frosts.

Water requirements and irrigation.

(*See also* 2209a, 2377, 2638, 2639, 2850, 3041, 3222-3225, 3294.)

2195. van Duin, R. H. A.
De waterbehoefte der gewassen. **(The water requirements of crops.)** [English summary 21 lines.]
Landbouwk. Tijdschr., 1954, **66**: 240-3, bibl. 3.

The amount of water transpired by a crop plant having an adequate soil water supply during the summer months varies with the rainfall and does not affect the yield. In Holland in the years 1947–51 the yields of various crops, including peas and beans, were related to rainfall deficiency. In 1947 drought over almost the whole growing season lowered the yields of all crops. In 1949, with a dry summer and autumn, but a wet spring, yields were no lower than in the wet years of 1950 and 1951.

2196. Anley, D.
Irrigation in Algeria.
World Crops, 1954, **6**: 107-8, illus.

In Algeria, irrigation is necessary for full development of vineyards, orange groves and fruit orchards. An account is given of dam-building and irrigation in this area.

2197. Pillsbury, A. F., and Taylor, E. H.
Pipe systems for irrigation.
Calif. Agric., 1954, **8** (2): 3-4, illus.

The 3 pipe systems described are the closed, open, and semi-closed systems; the semi-closed system appears to be superior in operating characteristics. [See also *H.A.*, 24: 1145o.]

2198. Krimgold, D. B.
Economic feasibility of supplemental irrigation.
Agric. Engng, St Joseph, Mich., 1954, **35**: 22-7, bibl. 26.

Experimental work on soil moisture-plant relationships carried out mainly in the Soviet Union and the United States is discussed. The author's conclusions, from analysis of data presented, in favour of supplementary irrigation, are supported by actual experience in southern New Jersey market gardens, where supplementary irrigation has been found profitable irrespective of prevailing weather conditions.

Practical devices.

(*See also* 2208i, j, t, w, 2536-2538, 3321.)

2199. Chappuis, E.
Le nouveau mastic à vitrer, "Gedurit". **(A new compound for glazing, "Gedurit".)**
Rev. hort. Suisse, 1954, **27**: 151-4, illus.

A new putty for glass insertion is described. It is a black paste, which stays at the same consistency in all weathers. It is applied by syringe.

2200. Malcolm, D. G., and DeGarmo, E. P.
Visual inspection of products for surface characteristics in grading operations.
Market Res. Rep. U.S. Dep. Agric. **45**, 1953, pp. 57.

Laboratory tests were made, with wooden objects to simulate fruit, to determine the conditions of translational and rotational speeds, direction of approach, number of rows, and certain other factors, which would give optimum inspection efficiency and minimum inspection time for grading fruit for visible surface defects. The results of these tests were then applied to actual grading and sorting operations in lemon, orange and other packing houses. It was found that relatively large savings could be made in grading and sorting which at present account for 15% of the total labour costs in Californian apple and pear packing houses.

2201. Courshee, R. J.
Characterising spraying nozzles.
World Crops, 1954, **6**: 91-4, illus.

An account is given of the measurement of performance of spraying nozzles, including the equipment and methods used and some of the results obtained.

2202. Green, V. E., Jr.
The scuffle hoe—a valuable tool for small plot work on non-rocky soils.
Agron. J., 1954, **46**: 94-5, illus.

The scuffle hoe described here can be manoeuvred under low-hanging branches without doing them injury.

2203. Anon.
Promising new mechanical hoe.
Comm. Grower, 1954, No. 3043, p. 889, illus.

A brief description is given of a tractor-mounted and tractor-powered implement which can hoe rows of small fruit, etc., at high speed. The hoeing is done by mower type blades, riveted separately to a revolving disc head; the blades cut the ground at a slight angle and are adjustable and easily replaceable. The hoe is guided by a man walking behind.

2204. Floor, J.
Planten in plastic. **(Plants in plastic.)***
[English summary ¼ p.]
Meded. Inst. Vered. Tuinbouwgew. **55,** 1954, pp. 13, bibl. 8, illus., fl. 0.50.

The author first describes his own trials on the use of plastic covers for propagating house plants and ornamental shrubs indoors. The results showed that such plants can be successfully propagated from cuttings in the living room provided the pot in which the cuttings are inserted is completely enclosed in polyethylene plastic. This maintains the cuttings in a saturated atmosphere and at the same time allows free exchange of oxygen and carbon dioxide. When the cuttings have rooted the plastic cover should be opened gradually in order to acclimatize the plants to the dry atmosphere of the room. Experiments are also reported which show that many house plants can be safely left without watering during a holiday period of a month provided that the whole plant, pot and all, or in some cases only the pot, is enclosed in polyethylene plastic. He then describes his own experiments and those of other workers on the use of plastic in commercial horticulture, including plastic as a substitute for glass for rooting cuttings, plastic for covering grafts and marcots, closed plastic boxes for seed germination, and plastic wraps for storing and packing plant material.

2205. Webber, E. R.
Polythene film for horticulture.
Plastics, 1954, **19**: 108-9, illus.

In a review of the many uses for polythene film in horticulture, mention is made of its use at Fernhurst Research Station to make a growing bed for tomatoes, ensuring a constant-level water table.

2206. Hamner, C. L., and Rai, G. S.
Plastic for plants.
Indian J. Hort., 1953, **10**: 74-7, illus.

"Airwrap" is a plastic film containing root hormones, vitamins, insecticides and fungicides. Cuttings are put in moist sphagnum moss, which is enfolded by the plastic film, and the whole is kept under normal propagating conditions; in 2 or 3 weeks the cuttings root, and may then be transplanted. "Airwrap" may also be used for air-layering, and preventing moisture loss in potted plants.

2207. Mullin, R. S., and Hunsinger, E. J.
A simplified unit for soil fumigation.
Market Grs' J., 1954, **83** (3): 36, illus.

A brief description is given of a tractor-mounted power fumigator which treats a 6 ft. strip, injecting the fumigants 6 in. deep, in rows 1 ft. apart.

Noted.

2208.

a Anderson, J. C., and others.
Fertilizer and lime recommendations for New Jersey.
Circ. N.J. agric. Exp. Stat. **552,** revised 1953, pp. 16.
Including fruit crops and vegetables.

b Anon.
The history of prepackaging.
Market Grs' J., 1954, **83** (4): 22, 25.
In the U.S.A.

c Becker, H., Blaszinsky, J., and Stirnberg, A.
Der Gartenbau in Dänemark und England. **(Horticulture in Denmark and England.)**
Verlag Kommentator G.m.b.H., Frankfurt/Main, 1953, 9½×6½ in., pp. 108, illus., being *Ber. Studienreisen im Rahmen d. Auslandshilfe d. U.S.A.* **42.**
Observations on a study tour in 1952.

d Belić, A.
Les sciences naturelles à l'Académie Serbe des Sciences. **(Natural science in the Serbian Academy of Science.)**
Vouk, V.
Natural sciences in the Yugoslav Academy of Science and Arts.
Kos, M.
Natural sciences in the Slovene Academy of Science and Arts.
Bull. sci. Cons. Acad. Yugosl., 1953, **1**: 3-6, 6-9, 9-10.

e Burström, H.
The rate of the nutrient transport to swelling buds of trees.
Physiol. Plant., 1948, **1**: 124-35, bibl. 3.
In *Carpinus* and *Fagus*.

f Butler, J. R.
Spectrographic estimation of lead in twig samples.
Analyst, 1954, **79**: 103-4, bibl. 3.

g Cavill, G. W. K., and Ford, D. L.
The chemistry of plant-growth regulators. Part I. 2: 4-dichloro-6-hydroxyphenoxyacetic acid and related compounds.
J. chem. Soc. Lond., 1954, pp. 565-9, bibl. 9.

h Dible, W. T., Truog, E., and Berger, K. C.
Boron determination in soils and plants. Simplified curcumin procedure.
Analyt. Chem., 1954, **26**: 418-21, bibl. 14.

i Eastwell, B. A.
***In situ* methods of measuring soil moisture content—a critical résumé.**
Tech. Rep. Brit. electric. Res. Ass. **W/T27,** 1953, pp. 19, bibl. 156, illus., 15s.

j Eberhardt, G.
Moderne Pflüge und ihre Leistungen in der Baumschule. **(Modern ploughs and their performance in the nursery.)**
Dtsch. Baumsch., 1954, **6**: 89-92, illus.

k Fischer, A.
Über die papierchromatographische und papierelektrophoretische Trennung von Indolderivaten. **(The separation of indole derivatives by paper chromatography and paper electrophoresis.)**
Planta, 1954, **43**: 288-314, bibl. 45.
Brussels sprout extracts.—Justus Liebig-Hochschule, Giessen.

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* Translation available at bureau.

l Gabrielsen, E. K.
Influence of light of different wave-lengths on photosynthesis in foliage leaves.
Physiol. Plant., 1948, **1**: 113-23, bibl. 15 [received 1954].
Plants included hazel and lettuce.

m Geissman, T. A., and others.
Xanthinin: a plant growth-regulating compound from *Xanthium pennsylvanicum*. I.
J. Amer. chem. Soc., 1954, **76**: 685-7, bibl. 12.

n Gericke, S., and Kurmies, B.
Die kolorimetrische Phosphorsäurebestimmung mit Ammonium- Vanadat- Molybdat und ihre Anwendung in der Pflanzenanalyse. **(The colorimetric determination of phosphoric acid with ammonium-vanadate-molybdate and its application in plant analysis.)**
Z. PflErnähr. Düng., 1952, **59**: 235-47, bibl. 5 [received 1954].

o Griggs, W. H., and others.
The storage of hand-collected and bee-collected pollen in a home freezer.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 304-5, bibl. 5.
At approx. −18° C.

p Grill, F., and Wohlmuth, N.
Eine kolorimetrische Methode zur quantitativen Bestimmung kleiner Borsäurmengen. II. **(A colorimetric method for the quantitative determination of small amounts of boric acid. II.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, 1953, **3**: 235-7; and 1954, *Ser. A*, **4**: 90-2, bibl. 2.

q Harder, R., and Bünsow, R.
Über die Wirkung der Tageslänge vor der Kurztaginduktion auf die Blütenbildung von *Kalanchoë blossfeldiana.* **(The effect of day-length prior to short day induction on flower formation in *Kalanchoe blossfeldiana*.)**
Planta, 1954, **43**: 315-24, bibl. 4, illus.

r Huygens, R., and Casimir, J.
Séparation chromatographique sur papier du saccharose, du glucose, du fructose et du sorbitol. **(The separation of saccharose, glucose, fructose and sorbitol by paper chromatography.)**
Bull. Inst. Agron. Gembloux, 1953, **21**: 8-13, bibl. 10.

s Lecomte, R., and Seilleur, P.
Extraction des carotènes en vue de leur détermination. **(The extraction of carotene for identification purposes.)**
Bull. Inst. agron. Gembloux, 1953, **21**: 14-25, bibl. 5.

t Logcher, C.
De constructie van tuinbouwtrekkers. **(The construction of horticultural tractors.)** [English summary $\frac{1}{4}$ p.]
Dinkla, P. E.
Het onderhoud van tuinbouwtrekkers. **(The maintenance of horticultural tractors.)** [English summary $\frac{1}{3}$ p.]
van der Heyden, S. J.
Het gebruik, de service en de nazorg van tuinbouwtrekkers. **(The use, service and after-care of horticultural tractors.)** [English summary $\frac{1}{4}$ p.]
Spijkman, L.
De correcte smering van benzine- en dieselmotoren, in gebruik bij de tuinbouw. **(The correct method of lubricating petrol and diesel engines used in horticulture.)** [English summary $\frac{1}{3}$ p.]
Meded. Dir. Tuinb., 1954, **17**: 95-8, illus., 99-103, illus., 104-5, and 106-7, respectively.

u M., A.
Schema di provvedimento legislativo per la concessione del "brevetto" per le novità vegetali. **(Proposed legislation to cover the granting of patents for new plant varieties.)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 118-20.

v Mader, H.
Untersuchungen an Korkmembranen. **(Studies on cork membranes.)**
Planta, 1954, **43**: 163-81, bibl. 40, illus.
In *Laburnum* spp.

w May, W. B.
Soil blocks.
E. Afr. agric. J., 1954, **19**: 194-5, illus.
Their use in East Africa, including a local soil-fertilizer mixture found suitable.

x Ministry of Agriculture, London.
Report of the working party on agricultural education, H.M.S.O., Lond., 1953, pp. 19.

y Norton, J. P., and Boll, W. G.
Callus and shoot formation from tomato roots *in vitro*.
Science, 1954, **119**: 220-1, bibl. 7, illus.

z Preston, W. H., Jr., Mitchell, J. W., and Reeve, W.
Movement of alpha-methoxyphenylacetic acid from one plant to another through their root systems.
Science, 1954, **119**: 437-8, bibl. 7.
An account of experiments previously summarized [see *H.A.*, 24: 1110].

2209.

a Stolp, D. W., and Butijn, J.
Beregening in West-Duitsland. **(Sprinkler irrigation in western Germany.)** [English summary 8 lines.]
Meded. Dir. Tuinb., 1954, **17**: 135-47, bibl. 16, illus.
Report of a study tour.

b Weller, L. E., Wittwer, S. H., and Sell, H. M.
The detection of 3-indoleacetic acid in cauliflower heads. Chromatographic behaviour of some indole compounds.
J. Amer. chem. Soc., 1954, **76**: 629-30, bibl. 9.

c Williams, T. R., and Morgan, R. R. T.
A rapid method for the determination of copper in plant material.
Chem. Ind. Lond., 1954, No. 16, p. 461, bibl. 2.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 2120, 2124, 3269y, 3286, 3319.)

2210. Bagenal, N. B.
History and development of the cultivated fruits. (Parts I and II.)
Ass. Agric. Rev., 1954, No. 22, pp. 5-10, illus., and No. 23, pp. 35-43, illus.

A short history of the apple from prehistoric times, with particular reference to its development in England, is given in Part I, and of the pear in France, Belgium and England in Part II.

2211. Bramley, W.
Europe's winter orchard.
Brit. agric. Bull., 1954, **7** (31): 43-6, illus.

A note on production in South Africa of table grapes, deciduous and citrus fruits and pineapples and the marketing thereof.

2212. (Eidg. Statistisches Amt, Bern.)
Der schweizerische Obstbaumbestand. **(A census of fruit trees in Switzerland.)** [German and French texts.]
Obstrundschau, 1954, **14** (10): 1-3.

A census of fruit trees, including walnut, fig and persimmon trees, was made in Switzerland in June 1951. The article is an extract from the report (pp. 280) published by the Statistical Office, Bern. Of 20·8 million fruit trees 14·2 m. were grown on farms. Apples were most numerous with 8·3 m., followed by pears (4·8 m.), plums (3·5 m.) and cherries (2·3 m.). Belle de Boskoop was by far the commonest apple variety.

2213. Comité National pour l'Étude de la Culture Fruitière, Belgique.
Rapport Succinct, Comité National pour l'Étude de la Culture Fruitière, Sept. 1952-Dec. 1953. **(Short Report, [Belgian] National Committee for the Study of Fruit Growing, September 1952-December 1953)**, pp. 37.

The results of many of the investigations briefly summarized in this report have already been published. *Soil research.* Effects of amount and method of application, by soil injection or surface placement, of fertilizers. Spread of fertilizers in the soil (radiophosphorus study). Fertilizer formulations for apple. Leaf analysis and its application to mineral deficiencies. Cover crops and cultivation in orchards. *Plant research —"cultural value" of the principal varieties of fruit tree.* Choice of soil, identification of plum and apple varieties, rootstocks, cytology. *Cultural research.* Pruning, thinning.

2214. Anon.
Fruit growing in the Australian States. Areas under cultivation and production.
Fruit World Annual, Melbourne, January 1954, pp. 41-3.

Notes are given on the horticultural crops and producing areas of each State. New South Wales is the chief producer of citrus and bananas, Victoria of pears, Queensland of pineapples, and South Australia of wine vines and almonds. The important crops in Western Australia are bananas, tomatoes and apples. Fruit growing is the major industry of Tasmania and apples are the chief crop.

2215. Scoresby.
Fruitgrowers' field day—Scoresby Horticultural Research Station.
J. Dep. Agric. Vict., 1954, **52**: 164-8.

This research station, which is 7 years old, is doing extensive work on rootstocks for apples, pears and plums, although so far no conclusive results have been reached. Research work on "black end" of pears and "gnarl" of Gravensteins is also described.

2216. Nel, R. I.
Deciduous fruit research. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1952/53].
Fmg S. Afr., 1954, **29**: 83-6, 103-4.

Pomological investigations: a 2% oil spray with double the usual amount of DNC caused breaking of rest in Peregrine peaches 10 days ahead of untreated trees; Merton 793 is a promising standard rootstock for apples; Ohenimure pollen is incompatible with Granny Smith pistils, but the reverse is compatible. *Plant breeding:* a new peach variety, Swellengrebel, is available, which ripens early and keeps well; it is hoped that a new plum cross between Sugar and President will result in a prune type resistant to delayed foliation. *Fertilizer trials:* lucerne was a satisfactory cover crop in irrigated orchards and vineyards; in peach orchards cover cropping gave lower yields. *Physiological studies:* 2,4,5-trichlorophenoxyacetic acid sprays advanced the ripening of Early Dawn, Peregrine and Elberta peaches by about a week.

2217. de Haas, P. G.
Bericht über die Forschungen auf dem Gebiet des Obstbaues in Deutschland seit 1945. **(A review of fruit research in Germany since 1945.)**
Land-u. forstwiss. ForschRat, Bad Godesberg, 1954, 11½×8½ in., pp. 105 (mimeo.), bibl. 686.

Since the end of the war publication of papers on fruit research in Germany has been widely scattered in a large number of journals, many of which enjoy only a local circulation. In his comprehensive review the author discusses the literature appearing in Western and Eastern Germany during the period 1945–53 under the following heads: I. Systematics and developmental physiology, II. Breeding, III. Rootstocks, IV. Varieties, V. Flower and fruit formation, VI. Ecology, VII. Cultural measures, such as soil management, pruning and plant protection, and VIII. Economics.

2218. Folley, R. R. W.
Economics of fruit farming, Report No. 2. The cost of growing apples, 1948-51.
Rep. Dep. agric. Econ., Wye Coll., 1954, pp. 41.

Cost accounting of apple growing was carried out for 6 farms in Kent and Sussex; figures are given for the composition of the mean total cost per acre in both grassed and cultivated orchards. Dessert varieties on bush trees were 30% more expensive to grow than cooking varieties, owing to the necessity for greater care of the trees and higher manuring.

2219. ITALY. ISTITUTO PER IL COMMERCIO CON L'ESTERO.
L'esportazione ortofrutticola italiana nel 1953. **(Italian fruit and vegetable exports in 1953.)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 89-96.

Total exports were 13% greater in weight and 27% greater in value in 1953 than in 1952. Fresh and dried fruit exports, except those for citrus, and vegetable exports showed increases. Figures are also given for exports of these classes of produce and chestnuts to various countries. Western Germany was by far the largest importer followed by Switzerland, Great Britain and Austria.

2220. GIORI, G.
Ferrara, regno di Pomona. **(Ferrara, realm of Pomona.)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 108-17, illus.

By far the most important fruit crop in Ferrara is the apple of which the 1953 crop, 2 million quintals, was a quarter of the national production; the chief varieties are Abbondanza, Imperatore, Delicious and Rambour Franc. The chief varieties of pears (150,000 quintals in 1953) are Williams' and Passe Crassane, of peaches (150,000) Mayflower and Amsden, and of plums Florence and Golden Drop . There is a shortage of cold storage space.

2221. VORŽEVA, L. V.
Fruit growing in the Baikal region. [Russian.]
Priroda, 1954, **42** (2): 101-3.

Notes are given on apples, mainly small-fruited, wild types of local origin or their crosses with cultivated varieties and large-fruited varieties, grown in prostrate form under very rigorous conditions in Siberia.

Climatic effects.

2222. BROWN, D. S.
Climate in relation to deciduous fruit production in California. VI. The apparent efficiencies of different temperatures for the development of apricot fruit.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 173-83, bibl. 6.

The apparent relative efficiencies of temperatures (in 2·5° F. increments) in promoting apricot development were determined by comparing correlation coefficients expressing the relationship between the relative amounts of time experienced at different temperatures and the total time from full bloom to harvest for Royal apricots. The minimum apparent efficiency occurred at about 42·5° F., and the optimum at about 72·5°. The apparent efficiency at 105° was equivalent to that at about 52·5°, or about 33% of optimum. Examples of the apparent efficiencies in interpreting orchard observations of fruit development are included in the discussion. [From author's summary.]

2223. SMOCK, R. M.
Some effects of climate during the growing season on keeping quality of apples.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 272-8, bibl. 8.

High soluble solids in McIntosh fruits at harvest were more strongly correlated with solar radiation during the later part of the growing season than during the entire growing season. There was a fair though not quite significant positive correlation between fruit firmness at harvest and solar radiation during the last six weeks of the growing season with McIntosh apples. A high degree of susceptibility to brown core in McIntosh was associated with low solar radiation and low mean temperatures during the last six weeks of the growing season. Scald susceptibility in McIntosh and R. I. Greening was associated with high mean temperatures during the last six weeks of the growing season. [Author's conclusion.]—Cornell Univ.

2224. BALTADORI. A.
Gli equivalenti pluviometrici del fico. **(The rainfall requirements of the fig.)** [English summary 16 lines.]
Ann. Fac. Agrar. Perugia, 1952, **8**: 141-9, bibl. 13.

During the dry summer period in southern Italy woody plants depend for their water supply on winter/spring rainfall stored in the soil, but they benefit from the light summer rainfall which counteracts the effects of the strong desiccating south winds by reducing the temperature, increasing the R.H. and moistening the leaves. In Apulia drought conditions for fig are considered to exist in the winter/spring when the average monthly rainfall for November/April is below 61 mm. and in the summer period (11 July–10 August) when the rainfall is below 9 mm. In fig fruit studies at Brindisi in 1946, weight was found to increase slowly during the first phase (up to the end of July), then to increase very rapidly in the critical 10 days prior to maturation and finally to fall gradually after maturation.—Ist. Ecol. agrar., Univ. Perugia.

2225. EGGERT, F. P.
The auxin content of spur buds of apple as related to the rest period.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 191-200, bibl. 16.

This study on the variations in seasonal auxin content of spur buds of McIntosh and Northern Spy apple varieties shows results comparable to those obtained by other workers. A significant negative correlation was found between total auxin content of spur buds and the activity of spur buds. A hypothesis is offered on the cause of rest based on the inhibition of buds by high auxin concentrations. [From author's summary.] —Univ. Maine.

Breeding and varieties.

(*See also* 2322d, g, k, m, 3284.)

2226. GRANHALL, I.
Aktuellt från amerikansk och svensk växtförädling med frukt. **(Latest developments in American and Swedish fruit breeding.)** [English summary 1 p.]
Sver. pomol. Fören. Årsskr, 1953, 1954, **54**: 98-109, illus.

Notes on observations in North America are followed by a brief account of the latest developments at Balsgård. In 1953 some very promising apple, pear, plum, cherry and hazel seedlings were selected for advanced trials from a total of 55,000 plants. The reaction of many fruit varieties to the spring frosts of 1953 and the induction of mutations by radioactive cobalt and other agents are also discussed.

2227. Johansson, E.
Alfa 68, den första tetraploida äpplesorten från Alnarp. (**"Alfa 68", the first tetraploid apple variety from Alnarp.**) [English summary 1 p.]
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 35-9, bibl. 2, illus.

"Alfa 68" is believed to be the first tetraploid apple to be raised from a cross of two commercial varieties, viz. Belle de Boskoop triploid, and Filippa diploid. After about 10 years' tests the new variety has now been released by Alnarp Gardens, Åkarp, Sweden. The tree is very vigorous and has spreading branches, especially on M.IX; it hardly comes into bearing before the 4th year, even on dwarfing rootstocks. The fruit, which ripens in the first half of October, has a good flavour, but in view of its large size it is best suited to cooking. Its ascorbic acid content is 10–15 mg./100 g.

2228. Hunter, A. W. S.
Tetraploidy in vegetative shoots of the apple.
J. Hered., 1954, **45**: 15-16, bibl. 8, illus.

A method is described for the application of colchicine to the growing tips of apples. Subsequent tetraploid sectors of growing shoots were identified by measurement of the stomata on the lower epidermis of the leaf; in a tetraploid epidermis the stomata measured from 40 to 52μ in length. The growth of lateral shoots subtended by known tetraploid leaves was encouraged, and the buds from these shoots were used for propagation.

2229. Bishop, C. J.
The inheritance of tree and fruit characters in natural polyploid apple seedlings.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 327-33, bibl. 15, illus.

A study of natural polyploidy in apples showed that the influence of polyploidy was greater than the heredity of the seedling. A noticeable feature was the spreading habit of the polyploid plants. While many of the polyploid characteristics are desirable, others, such as a coarse granular texture and poorer quality of the fruit are not.

2230. Granhall, I.
Frost resistance problems in fruit tree breeding.
Proc. 7th int. bot. Congr., 1950, 1953, p. 201.

Artificial exposure of branches and twigs of apples and other fruits to temperatures at −30° to −40° C. for 24 to 48 hours in January and February gave parallel results to those obtained from field observations on the hardiness of market varieties. From examination of seedlings it seems evident that polyploidy does not decide hardiness.

2231. Emmert, F. H., and Howlett, F. S.
Electrolytic determination of the resistance of fifty-five apple varieties to low temperatures.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 311-18, bibl. 9.

Electrolytic determinations for hardiness were made on the twigs of 55 apple varieties in autumn, mid-winter, late winter and early spring. The autumn results agreed well with current hardiness concepts, while no such agreement was evident for later results. With few exceptions, varieties very hardy in autumn assumed a more tender position with time in relation to other varieties, while the less hardy and tender varieties of autumn became relatively more hardy as the season progressed. The change in the relative hardiness of individual varieties was possibly due to the different rate at which seasonal changes in absolute hardiness occurred. Hardiness differences between varieties diminished as the winter progressed, the greatest changes taking place between autumn and mid-winter. In view of these findings it is suggested that varieties examined for hardiness should be tested 3 times during the dormant season, namely in autumn, mid- or late winter, and early spring when late "de-hardening" may affect resistance to late spring frosts.—Ohio St. Univ., Columbus.

2232. Granhall, I.
Kan äppelskorven bemästras genom växtförädling? (**Is it possible to control apple scab by breeding?**) [English summary ¾ p.]
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 17-28, bibl. 17.

Breeding work to obtain scab-resistant apple varieties has been initiated at Balsgård, where *Malus floribunda* and other *Malus* spp. are used as parents.

2233. Shay, J. R., and others.
Apple scab resistance from a number of *Malus* species.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 348-56, bibl. 4, illus.

Notes are given on some *Malus* spp. evaluated earlier [see 2232 above and *H.A.*, 22: 3608] which cross readily with susceptible commercial varieties.

2234. Roby, F.
Las principales variedades de peral cultivadas en Argentina. (**The chief varieties of pear grown in Argentina.**)
Publ. Centr. reg. andino Invest. agropec. Mendoza **8**, 1953, pp. 68, bibl. 16, illus.

Notes are given on 13 pear varieties commercially grown in Argentina as follows: botanical description, flowering and picking dates, self-fertility, cold storage tests, marketability in the domestic and foreign market, and recommendations regarding future scale of cultivation.

2235. Evreinoff, V.-A.
Note sur l'origine des nectarines. (**Note on the origin of nectarines.**)
Rev. int. Bot. appl., 1953, **33**: 577-81, bibl. 4.

The four theories held on the origin of the nectarine are that it is (1) a sport of the true peach, (2) a true peach × plum hybrid, (3) an almond × plum hybrid (like the true peach), and (4) an independent species. The author inclines to the last theory and considers that the nectarine's probable place of origin is Turkestan (the Ferghana Valley in western Thian-Chan).

2236. Oberle, G. D., and Nicholson, J. O.
Implications suggested by a peach to nectarine sport.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 323-6, bibl. 11, illus.

The fruit size and weight of a nectarine sport observed on a Redcrest peach tree were less than half that of normal peaches on the tree and about the same as that of fruits of nectarine varieties growing in the same orchard. Sporting to the nectarine condition seems to be associated with pronounced reduction in fruit size.

2237. Kazjmin, G. T.
Results of crossing the Ussurian plum with apricot and *Prunus tomentosa*. [Russian.]
Agrobiologija, 1953, No. 6, pp. 132-7, illus.

At Khabarovsk, in the Soviet Far East, the Ussurian plum, *Prunus ussuriensis*, was crossed with apricot and *P. tomentosa* with the aim of obtaining good quality fruit on trees resistant to the most common local disease of plums, *Rhodoseptoria ussuriensis*. The interspecific cross pollination resulted in as high a percentage of fruit set as any intervarietal cross pollination, viable seed was produced and seedlings were raised. The hybrid seedlings were, however, weak, but when worked on either Ussurian plum or apricot seedling rootstocks they grew satisfactorily. The morphological characters of some of the hybrids are described. All surviving plants appeared resistant to *R. ussuriensis*; fruit production has not yet started.

2238. Venjjaminov, A. N.
The development of new varieties of apricot by means of special technical treatment. [Russian.]
Agrobiologija, 1953, No. 3, pp. 9-18, bibl. 1.

Twelve hardy, good quality varieties were developed at Voranetz over a number of years, by cross-pollinating apricots of widely different origin with some of Mičurin's varieties and working them on frost-resistant apricot or plum rootstocks. Five of the new varieties are described.

Propagation and rootstocks.

(*See also* 2170, 2204, 2206, 2322n, p.)

2239. Breviglieri, N.
Il materiale di propagazione in arboricoltura. (**Fruit tree propagating material.**)
Ital. agric., 1954, **91**: 119-35, bibl. 16, illus.

The situation in Italy regarding the production and control of fruit tree propagating material is not satisfactory at present. Recommended remedies are: (1) better control of nurserymen to ensure the maintenance of the genetical and pomological character of stock and scion material and a better standard of hygiene; (2) importation of plant material and seeds by research institutions only, to prevent abuse and the multiplication of diseased or inferior material; (3) the introduction of horticultural patents for new varieties for the protection of breeders, nurserymen and growers, and of nursery trademarks for the guarantee of the authenticity and origin of material and of better clonal strains; and (4) the establishment of horticultural sub-stations in the more important areas to support existing research stations and to maintain a detailed and up-to-date inventory of fruit varieties in co-operation with other bodies.

2240. Karnatz, H.
Untersuchungen über das Keimungsverhalten der Myrobalane. (**A study of myrobalan germination.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 91-5.

The data presented show that rate and percentage of myrobalan germination are affected by the source of the seed. Myrobalan rootstocks should, therefore, be raised from seed of selected parent trees. Preliminary observations suggest that winter hardiness also varies with the source of the rootstock.

2241. Košelenko, V. M.
To increase the germination of cherry seeds. [Russian.]
Agrobiologija, 1953, No. 6, pp. 129-32, bibl. 5.

Tables are given showing that the seeds of the sour cherry variety Ljubskaja stratified from harvest till sowing, 224 days in 1951, 245 in 1952, germinated better and grew more vigorously when stratified in damp moss than in sand or peat. [See also *H.A.*, 24: 108.] For the stratification of 1 kg. cherry stones 350 g. dry moss is required.

2242. Oratovskiĭ, M. T.
Overcoming non-viability of seeds in early cherry varieties. [Russian.]
Agrobiologija, 1953, No. 2, pp. 109-13, illus.

At Melitopoljsk, viable seeds of the early cherry variety Rannjaja Marka were produced by retarding ripening through reducing the number of leaflets on fruiting branches to 1–2 per rosette soon after fruit set. In 1950 about 100 seedlings were raised from seed obtained by this method from cross-pollinated flowers of Rannjaja Marka. Some weaker seedlings were also obtained from open-pollinated seed.

2243. Singh, S. N., and Sharma, M. K.
Studies on the effect of some hormones on the rootage of *Eriobotrya japonica* Lindl. var. Golden Yellow.
Sci. and Cult., 1954, **19**: 508-9, bibl. 2, illus.

Experiments at Lucknow on the effects of rooting hormones on loquat cuttings showed that α-naphthaleneacetic acid gave the highest % rooting.

2244. Sax, K.
Interstock effects in dwarfing fruit trees.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 201-4, bibl. 9, illus.

McIntosh, Cortland, Baldwin and Stayman apple varieties were budded on semi-dwarfing 33340 seedlings (*Malus sargenti* × *M. astracanica*) and on 33340 whips budded on *M. sikkimensis* rootstocks. McIntosh and Cortland grew well on 33340 whether used as rootstock or intermediate stem-piece. The other 2 varieties made very little growth on 33340 rootstocks, but good growth on 33340 stem-pieces, indicating that incompatibility is determined by the interaction of the scion variety and the root system rather than by a bad graft union. The dwarfing effect of certain dwarfing stem-pieces, particularly Malling VII, VIII and IX, and of inverted rings of bark, the influence of which is here described, may be due to the checking of auxin flow to the roots.—Bussey Insts, Harvard Univ., Mass.

2245. Filinger, G. A.
Apple rootstock studies in Kansas.
Fruit Var. hort. Dig., 1953, **8**: 55-6.

Since 1938 French Crab rootstocks, clonally propagated, have been studied at Kansas Agricultural Experiment Station. Observations on 62 of these clones grafted on the scaffold branches to Jonathan and Winesap showed variations in hardiness, strength, pest resistance, compatibility and drought resistance.

2246. Mann, A. J., Keane, F. W. L., and Lapins, K.
Apple frameworks and rootstocks in British Columbia. Part I. Frameworks.
Publ. exp. Fms Serv., Dep. Agric., Ottawa **898,** 1953, pp. 7-26, bibl. 16, illus.

Experiments in British Columbia since 1926 have been aimed at overcoming the cold-susceptibility of apple varieties grown in this region, by double working. Canada Baldwin, McIntosh, Hibernal and Virginia Crab have been extensively tested as frameworks for Delicious. Canada Baldwin makes an excellent framework, but crown-rot resistant rootstocks should be used; McIntosh also gives vigorous and productive trees but is itself susceptible to temperatures below −30° F.; Hibernal is no longer recommended as a framework as it cannot support heavy crops of Delicious; Virginia is not suitable under B.C. conditions, as it makes an uneven framework and may later become dwarfing.

2247. Mann, A. J., Keane, F. W. L., and Lapins, K.
Apple frameworks and rootstocks in British Columbia. Part II. Rootstocks.
Publ. exp. Fms Serv., Dep. Agric., Ottawa **898,** 1953, pp. 27-39, bibl. 15, illus.

Rootstock recommendations are given for trees of different sizes under British Columbia conditions.

2248. Müller, H., and Borck, B.
Zur Frage der Erhöhung der Standfestigkeit von schwachwachsenden Apfelniederstämmen durch Verwendung starkwachsender Unterlagen und schwachwachsender Zwischenveredlungen. **(On the problem of improving anchorage in small apple trees by the use of vigorous rootstocks with dwarfing rootstocks as intermediates.)**
Arch. Gartenb., 1953, **1**: 421-7, bibl. 1, illus.

Two apple varieties were worked on apple seedlings (Hüttner) and on the medium-vigorous Pillnitz stock R15/16 with M. IX and Pillnitz selections from M. IX as intermediates of 20 and 40 cm. length. Tree habit and yields were determined by the dwarfing intermediate rootstock, the length of which seems to have some influence on the development of the top. Anchorage of the trees was improved, but this advantage was more than outweighed by prolific sucker development from the root.—Inst. Gartenb. Dresden-Pillnitz.

2249. Thomas, L. A.
Stock and scion investigations. X. Influence of an intermediate stem-piece upon the scion in apple trees.
J. hort. Sci., 1954, **29**: 150-2, bibl. 4.

The introduction of an intermediate stem-piece of several apple varieties between the rootstock Malling II and the ultimate scion, Jonathan or Delicious, has generally resulted in decreased vegetative growth when compared with Jonathan and Delicious double-worked on themselves on Malling II stocks. In no instance have the trees with intermediate stem-pieces grown larger or out-yielded the trees with the simpler make-up. [Author's summary.]—C.S.I.R.O., Stanthorpe, Queensland.

2250. Borgman, H. H.
Kali/magnesiumverhoudingen in grond en blad en de invloed van enkele appelonderstammen op het optreden van K- en Mg-gebrek. **(Potash-magnesium ratios in the soil and the foliage of apples and the effect of some apple rootstocks on the incidence of K and Mg deficiency.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1954, **17**: 108-16, bibl. 5.

Graphs are presented showing the incidence of K and Mg deficiency in apples on M. XVI and crab, M. IV and M. IX rootstocks at various levels of soil K and Mg. It is concluded that the type of rootstock determines the incidence of K and Mg deficiency in the trees, provided the soil contains certain reserves of plant nutrients. Graphs are also presented showing the limits of Mg and K contents of fresh petioles and dried leaves at which deficiency occurs.

2251. Friedrich, G.
Beiträge zur Stoffwechselphysiologie der Obstgehölze. Untersuchungen über Assimilation, Transpiration und Mineralstoffwechsel einiger Edelsorten (Apfel und Birne) unter dem Einfluss verschiedener Unterlagen bzw. Stammbildner). **(The metabolism of fruit trees. Studies on the effect of rootstocks and stem builders on photosynthesis, transpiration and mineral metabolism of some apple and pear varieties.)** [English, French, Russian summaries.]
Kühn Arch., 1953, **67**: 199-265, bibl. 36.

It was the object of this investigation to find a quantitative expression for the influence of rootstocks and stem builders on the metabolism of some pome fruit varieties. (1) *Photosynthesis.* Leaves of Ontario spindle bushes on M. IX showed the highest rate of photosynthesis which was equalled by ¼-standard trees on M. XI in combination with certain stem builders. The leaves of "incompatible" combinations were photosynthetically very efficient considering their low chlorophyll content, but the viability of such trees was limited. (2) The *carbohydrate content* of Ontario leaves could not be used as a metabolic index in view of its great diurnal and seasonal variations. Leaves of "incompatible" combinations had an extremely high sugar content which points to a stoppage in the transport of assimilates. (3) The *intensity of transpiration* in Ontario leaves was also subject to too great seasonal variation to be of value as an indicator. The water balance of trees on M. IX, however, was found to be particularly efficient. The abnormal metabolism of "incompatible" combinations was not reflected in their water economy. With both apples and pears the transpiration curve became very irregular towards the end of the season. The rate of transpiration of Bartlett pear on several *Pyrus betulifolia* clones and of Bartlett and Alexander Lucas on seedlings and on Quince A, with or without intermediates, proved to be affected by the rootstock. Some combinations, such as Quince A/Beurré Hardy/Bartlett, were shown to have an especially efficient water economy, which makes them suitable for dry areas, while others (Quince A/Bertrams/Bartlett) tend to waste water. (4) The *mineral content* of Ontario leaves and the ratio of nutrients to one another (especially Ca: K) was relatively uniform in the case of trees on M. rootstocks without intermediates. In contradistinction, "incompatible" combinations showed a great deal of variation amounting to a complete loss of balance at the beginning of the season. Similar, though less pronounced, disturbances occurred in the presence of most stem builders, which may be a symptom of reduced compatibility. (5) *Catalase*. During the winter months the enzyme activity in the bark showed characteristic curves for each rootstock and each scion variety grown on its own roots. In some cases the scion variety retained its curve of enzyme activity after union with the stock, but mostly the curve was changed to such an extent that the worked tree appeared to be governed by a law of its own. It is hoped to supplement these preliminary findings by further experiments. [Shortened translation of German summary.]—Inst. Obst- u. Gemüsebau, Martin-Luther Univ., Halle-Wittenberg.

2252. Fujii, T., and Otomo, C.
On uniting process in grafting of Japanese pear. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1953, **22**: 149-52, bibl. 6, illus.

An account is given of development of the union in stem piece grafts of Japanese pear on common stock.

2253. Karnatz, H.
Zur Vermehrung der vegetativ vermehrbaren Vogelkirsche F 12/1. (**The propagation of mazzard F 12/1.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 127-8.

The cherry rootstock F 12/1 has become very popular in Germany. In a comparative trial at Jork, layering, as recommended by East Malling, produced more rooted plants of the desired diameter than did stooling. Earthing up in April rather than in June raised the number of layers per parent plant from 2·3 to 3·6.

Pollination.

(*See also* 2208o.)

2254. Sprenger, A. M.
Een enkele ervaring op het gebied van de bestuiving van fruitbomen. (**An observation on the pollination of fruit trees.**)
Fruitteelt, 1954, **44**: 379, 384.

The author noticed an unmixed stand of trees near Wageningen of the self-sterile cherry variety Abbesse de Mouland, which set good crops each year. This is thought to be due mainly to pollination by numbers of wild insects. This indicates that it is not always necessary to interplant different cherry varieties, and that spraying should be done with more thought to the wild insect-fauna on the trees.

2255. Bernhard, R., and Delmas, H. G.
Observations sur la biologie florale du pêcher. (**Notes on the floral biology of the peach.**)
Ann. Amél. Plantes, 1953, **3**: 389-400, bibl. 8, illus.

An account is given of studies on (1) anther morphology in relation to presence or absence of pollen; (2) the stage at which pollen abortion occurs in male-sterile and pollen-less varieties (the tetrad stage); (3) pollen in J. H. Hale and its different strains (2 out of 3 pollen-less); (4) pollen germinative capacity in different varieties. This is high when the grains are of regular shape and free from abnormalities. (5) Fruit set and fertilization. Fruit set can occur and proceed to a certain stage without fertilization and (6) Self-fertility. Of the 353 varieties studied all were self-fertile except the pollen-less ones, namely J. H. Hale, June Elberta, Japan Golden Giant and Chinese Cling.

2256. Remy, P.
Contribution à l'étude du pollen des arbres fruitiers à noyau, genre *Prunus*. (**A contribution to the study of the pollen of stone fruit trees. The genus *Prunus*.**)
Ann. Amél. Plantes, 1953, **3**: 351-88, bibl. 28.

Morphological and physiological studies were made of the pollen of more than 80 varieties of some 12 species of *Prunus* to obtain further knowledge on its morphology, germination and, in particular, the effect of different chemical factors on germinative capacity. Results and conclusions were: (1) the proportion of normal grains appears to be a varietal characteristic; (2) no direct relationship exists between grain size and number of chromosomes; (3) there is in general a positive correlation between grain size and stylar length; (4) germinative capacity varies much too widely to be considered as a varietal characteristic and appears to be greatest when the pollen density on the stigmatic surfaces is high; (5) Elberta shows equal proportions of long and short pollen tubes, a phenomenon resulting from segregation during meiosis; (6) iron greatly stimulated and copper greatly inhibited germination; (7) of a dozen insecticides and fungicides tested only chlordane and micronized sulphur did not kill the pollen; even they greatly reduced its growth rate; (8) growth substances at low concentrations, except perhaps tri-iodobenzoic acid, had little effect on germination; (9) pollen stored in a magnesium chloride desiccator at about 0° C. was fertile after a year.—Stat. Rech. Sud-ouest, Pont-de-la-Maye, Gironde.

2257. Metlickiĭ, Z. A., and Devjatov, A. S.
The effect of pollinators on the properties of apple seeds. [Russian.]
Agrobiologija, 1953, No. 3, pp. 19-28, illus.

In trials over 3 years 29,000 flowers of Siberian, prune-leafed and cultivated varieties of apples were artificially cross-pollinated. The pollinators are shown to have affected fruit size, number of seeds produced, rate of post-harvest ripening of seeds, germination, seedling vigour and root type. Some of the results are tabulated.

2258. Zdruĭkovskaja, A. I.
Increasing the viability of seed embryos of early cherry varieties. [Russian.]
Agrobiologija, 1953, No. 2, pp. 113-15.

The embryos of seed of early cherry varieties obtained from pollination with mixed pollen and grown in sterile culture were about twice as viable as those obtained from pollination with pollen of a single species.

Growth phenomena.

(*See also* 2322c.)

2259. Forshey, C. G.
Blossom structure and its relation to fruit set in Delicious and several other commercially important apple varieties.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 154-8, bibl. 6.

Pistil and stamen length measurements were made in Ohio on 6 important apple varieties and 4 of their mutations. Although the pistil-stamen relationship was found constant within a variety, there were some small differences in actual length of the essential organs between flowers from different positions in the cluster. The essential organs were shortest in terminal flowers, intermediate in length in weak laterals and longest in strong lateral flowers. Where varieties were compared with their mutations, the stamen-pistil relationship found in the standard variety also occurred in the mutation. Since the light-setting variety Delicious had the same pistil-stamen relationship as the heavy-setting varieties Jonathan and Rome Beauty, fruit set does not appear to be affected by blossom structure.

2260. Bell, K. E.
Cellular development of Golden Delicious apple from blossom to maturity.
Diss. Abstr., 1954, **14**: 213-14, being *Publ.* 6917 of 122 pp.

Fruit samples were collected at weekly intervals from Golden Delicious throughout the 1952 season; from these a study was made of the cellular development from full bloom to maturity. The extensive intercellular space system in this variety may be the cause of the marked shrivelling which occurs in this variety.

2261. Černenko, E. S.
An apetalous apple tree. [Russian.]
Priroda, 1953, **42** (12): 105-8, bibl. 2, illus.

Unusual flowers with metamorphosed organs were observed on 9 hybrid apple trees (Pepin Litovskiĭ × Anis). Such flowers had neither corolla nor stamens, the petals being replaced by another set of sepals, and had 9 to 18 styles. The apetalous hybrids flowered regularly though somewhat late, and when artificially pollinated 2 of them produced fruit. The apples were oblong, of small to medium size and had 2 seed receptacles, both containing viable seed. Seedlings raised from these seeds flowered normally and produced fruit. The value of apetalous female flowers for breeding is discussed and the occurrence of similar phenomena recorded in literature is noted.

2262. Breviglieri, N.
Ricerche su sistemi radicali di alberi di peschi. (Secondo contributo.) (**Studies on the root systems of peach trees. (Second contribution.)**) [English summary 15 lines.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 1-19, bibl. 2.

The root systems of mature peach trees growing under different conditions in the Ferrara and Forli districts were excavated. The method is described and general conclusions are drawn as to the best type of soil for peach growing in these areas. Among factors militating against good root development are high water table, irrigation—which results in shallow rooting—, deep ploughing, lack of cultivation—which should, however, be limited to 15–18 cm.—and compaction of soil resulting from the growth of lucerne. Nursery plants have tap roots but the adult trees examined showed no signs of these, their place being taken by large inclined roots. The horizontal spread of the root system considerably exceeds that of the crown in trees with moderate-sized crowns. Most of the roots are found at a depth of 25 to 100 cm. [See also *H.A.*, 23: 165.]

2263. Visser, T.
Optreden en anatomie van "Klumpke-vruchten" bij appels. (**Occurrence and anatomy of beaked fruit in apples.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1954, **17**: 171-8, bibl. 7, illus.

The occurrence and origin of fruits having a fleshy protuberance by the stem was investigated in Cox's Orange Pippin, Laxton's Superb and Gronsvelder Klumpke. With Cox and Laxton the phenomenon is commonest among the terminal fruits, and is due to the influence of physiological factors on the initiation and development of fruit and flowers. In Gronsvelder Klumpke the beaked character occurs in both terminal and lateral fruits. It arises as the result of the formation of an irregular vascular bundle at a point lower down the pedicel than normal.

2264. Crane, J. C., and Baker, R. E.
Growth comparisons of the fruits and fruitlets of figs and strawberries.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 257-60, bibl. 18.

Periodic measurements showed that growth of the fruit and fruitlets of the fig was characterized by two periods of rapid diameter increase separated by a period of slow increase in diameter. In contrast, growth of the strawberry fruit (receptacle) and its fruitlets (achenes) was not cyclic but proceeded at practically a constant rate. Based upon the fact that the fruitlets of the fig grow and develop morphologically like the fleshy drupaceous fruits, it is proposed that they be referred to as drupelets rather than as achenes as they have been commonly called. Splitting of fig fruits at about the time of their maturity is pointed out to be the result, undoubtedly, of a difference in growth rate between the drupelets and the syconium surrounding them. [Authors' summary.]—Univ. Calif., Davis.

Nutrition.

(*See also* 2208a.)

2265. Mori, H., and Sakamoto, K.
Studies on the leaf analysis of apples. I. On the leaf analysis of apples in Aomori Prefecture. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1953, **22**: 129-37, bibl. 30.

The nitrogen, phosphorus and potassium contents of the leaves of Rall's Janet and Jonathan apple varieties were studied for 3 years. There were varietal differences in N and K. N was higher in more productive than in less productive orchards. Lower N and higher K tended to produce better fruit colour. N and P were higher and K lower on alluvial than on volcanic ash soils. N tended to be significantly lower under sod management than under clean cultivation. Leaf mineral contents were highest in 1952, an on-year following an off-year, lowest in 1950, an on-year preceding an off-year, and intermediate in 1951, an off-year. Leaf N decreased slightly with tree age. N and P decreased gradually from June to September. N content and yield were related; the lowest leaf N levels (dry matter) in early July to give more than 800 bushels per acre were 2·8 and 2·6% in Rall's Janet and in Jonathan respectively. Deficiency symptoms were not observed even when K and P were below 1·0 and 0·1% respectively. Japanese apple leaves have generally rather high N and low K contents, possibly due in part to their heavy bearing habit.

2266. Wehunt, R. L., and Purvis, E. R.
Mineral composition of apple leaves in relation to available nutrient content of the soil.
Soil Sci., 1954, **77**: 215-18, bibl. 15.

A survey was made of representative commercial apple orchards in New Jersey to determine the degree of association between available nutrients in soils and those taken up by trees. Correlation coefficients were calculated for 94 pairs of leaf and soil samples collected from apple-producing areas in the state. A significant correlation coefficient of +0·21 resulted between available soil K and leaf K. Increasing available soil Ca plus Mg plus P depressed the content of K in the leaves. The depressive action of soil Ca plus Mg on leaf K had a higher degree of significance than did soil P. When partial correlations were employed to eliminate the influence of soil Ca plus Mg and soil P on leaf K, a highly significant coefficient of +0·69 was obtained between soil and leaf K. Leaf Mg was not significantly related to available soil Mg or P. But leaf Mg was correlated with available soil K by a highly significant coefficient of −0·60. Little correlation was found between available soil P and leaf P. Leaf P and available soil K were related by a highly significant coefficient of +0·51. The relationship found between soil Mg and leaf P was not significant. The correlation obtained between soil pH and leaf K was not significant. The degree of association between available soil Ca and leaf Ca was insignificant. Leaf N showed a highly significant negative correlation with available soil K. [Authors' summary.]

2267. Cain, J. C.
The effect of nitrogen and potassium fertilizers on the performance and mineral composition of apple trees.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 46-52, bibl. 7.

In a 5-year fertilizer experiment N increased growth up to 4 lb. of ammonium nitrate per tree, but maximum fruit production occurred at the 1 lb. level and early yields were reduced at all levels. The total K and P content of shoot leaves was reduced whereas that of dormant shoots was increased by N. Mg was increased in both leaves and shoots. K increased trunk growth and produced a slight improvement in leaf colour and fruit ripening but had no significant effect on shoot length, leaf size or weight. Mg, the only element affected to any extent by K, was reduced in both leaves and shoots by application of K.

2268. Cain, J. C.
The absorption and distribution of mineral nutrients in apple trees as affected by nutrient supply.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 53-66, bibl. 30.

Data are presented for the analysis of total amounts of N, P, K, Ca and Mg in different tissue fractions of 5-year-old McIntosh apple branches from 11-year-old trees which had been fertilized with N and K for 5 years. The data indicate that differences in shoot leaf composition commonly observed do not represent corresponding differences in the composition of the rest of the tree, and that such changes cannot be interpreted as differences in absorption or uptake of nutrients by the tree. Data are also presented on the analysis of total amounts of N, P, K, Ca and Mg in different tissue fractions of whole young Rome Beauty apple trees grown in sand culture under different levels of each of these elements in the nutrient solution. These data indicate that one ion has little if any direct effect on the total absorption of another by the tree, although the percentage of one ion may be decreased by the application of another, if its rate of absorption does not keep pace with the rate of growth stimulated by the added ion. [From author's summary.]

2269. Lecrenier, A., Dermine, E., and Trzcinski, T.
Contribution à l'étude de la nutrition du pommier par un essai en vases de végétation. Un aspect de l'effet des fumures croissantes sur la composition minérale des différents organes du pommier. 1^{e} partie. (**Study of apple nutrition by pot tests. The effect of increasing manures on the mineral composition of different parts of apple trees. Part 1.**)
Bull. Inst. agron. Gembloux, 1953, **21**: 26-41, bibl. 19.

At Gembloux a complete nutrient solution in 3 concentrations was applied for 3 years to Cox's Orange Pippin on M. II grown in pots. The composition of the single dose of the solution in g. per litre was: P 0·0252, S 0·0702, Cl 0·0152, Ca 0·0162, Mg 0·0389, K 0·132, Na 0·0622, N 0·0837, +B, Mn, Zn, Cu, Fe, Ni, Co. The other two concentrations contained twice and three times as much respectively, and the control received water. Samples of one- and two-year-old plant parts were analysed and the ash was weighed. Results showed that the triple dose, though better than the control, had a depressing effect on vegetative growth compared with the double dose. The single and double doses showed the limits of beneficial influence on growth and accumulation of salts. The ion accumulation, with the triple dose, was not proportional to the fertilizer rate.

2270. Ljones, B., and Braadlie, O.
Innhaldet av plantenaeringsemne i epleblad frå norske frukthagar. (**The content of nutrient elements in apple leaves from Norwegian orchards.**) [English summary $1\frac{1}{2}$ pp.]
Forskn. Landbruk., 1954, **5**: 115-39, bibl. 13.

In September 1952, 133 leaf samples of the apple variety Gravenstein were collected from 101 commercial orchards in the fruitgrowing areas of eastern and western Norway. Analyses were made for ash, N, P, Ca, Mg, K, Na, and B, and the results are fully presented and discussed. Apart from the significant differences in composition that appeared on grouping the samples according to locality (East and West), certain differences existed also between trees with heavy and medium crops, the former having a higher Ca and Mg content and a lower K content. Grouping of the material according to age of tree revealed only slight differences. Samples from Mg-deficient trees had a lower Ca and Mg content and a higher K content than leaves from symptomless trees. The values found for each nutrient were grouped into 6 classes and the following figures represent the highest class in % dry matter: N 2·51–2·75, P 0·18–0·22, Ca 1·26–1·50, Mg 0·23–0·27, K 2·01–2·50. Generally speaking significant negative correlations were found to exist between K and Ca, K and Mg, K and N, N and P, and positive correlations between K and ash, N and Ca, Ca and Mg, P and ash, N and Mg, and K and P.

2271. Ljones, B.
Nokre verknader av gjødsling med kalium til frukttre. (**Some effects of potassium manuring on fruit trees.**) [English summary $6\frac{3}{4}$ pp.]
Forskn. Landbruk., 1954, **5**: 1-113, bibl. 76.

The paper gives a detailed account of two experiments: I. A long-term trial involving 3 apple varieties and 4 levels of K applications, viz NP, NPK, NP2K and NP3K, NPK being the equivalent of 30 kg. calcium nitrate, 30 kg. superphosphate and 30 kg. potassium sulphate per 100 m^2. II. Potassium sulphate, hydrated lime and dolomite were applied to young apple trees on an acid soil where previous plantings had shown Mg deficiency. Part A deals with the effect of manuring on soil composition and on yield and growth of the trees, and Part B with its effect on plant composition. Of the many data recorded and conclusions reached, only a few can be mentioned in this abstract. (1) During the experimental period (1944-51) applications of K did not affect tree growth, but they produced a significant increase in yield in the varieties Gravenstein and Åkerø. The difference was significant only between NP and NPK and was slight between NPK and the higher levels of K. (2) Fruit drop was higher from trees receiving K, but calculations show that K manuring was profitable in the case of the two varieties mentioned. (3) In experiment II Laxton's Superb was budded on M. II in 1950. In the following year NMg-trees made better growth and the foliage showed much less pronounced Mg deficiency symptoms than the NCa- and NK-trees. (4) The relation of manuring and the seasonal composition of leaves in various positions and in on- and off-years is illustrated by data. The author concludes that leaf samples should be taken from on-year trees if the analyses are to be used as a guide to manuring and that the leaves near the tip of the shoot should be avoided. A leaf K content exceeding 1·5% of the dry matter is considered to indicate luxury consumption. Mg deficiency symptoms were found to be associated with a leaf Mg content of less than 0·25% in samples taken in September from on-year trees, while in off years the Mg content could drop to 0·10% without any clear symptoms appearing. (5) Data are also presented on the effect of K manuring on the K content of the wood and bark of young apple trees (II) and on that of apple fruits (I). Fruit pulp was found to contain more P, far more K and less Ca than the dry matter of leaves, when the comparison was based on N.

2272. Degman, E. S.
Effect of boron sprays on fruit set and yield of Anjou pears.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 167-72, bibl. 1.

Experiments on the effect of boron-containing sprays were conducted at Medford, Oregon, over 4 seasons, all of which were favourable for fruit set in Anjou pears. Healthy trees having no deficiency symptoms such as blossom blast and dieback showed no response to boron applications. In another part of the State boron applied to deficient trees resulted in considerable yield increase and improved growth.

2273. Simons, R. K.
Growth, leaf composition and nutrient-element balance of Montmorency cherry (*Prunus cerasus* L.). Effect of varying concentrations of ten nutrient-elements.
Diss. Abstr., 1954, **14**: 215, being *Publ.* 6858 of 131 pp.

One-year-old Montmorency cherry trees were grown in sand cultures, and supplied with nutrient solutions of varying concentrations. The optimum concentration was as follows: N 224 p.p.m., P 68 p.p.m., K 86 p.p.m., Ca 176 p.p.m., Mg 58 p.p.m., Mn 5 p.p.m., B 3 p.p.m., Fe 2 p.p.m., Zn 2 p.p.m., Cu 2 p.p.m. Each nutrient-element was varied individually in four ways, omitted, $\frac{1}{2}$, 2 and 4 times the optimum. Results showed that maximum growth was obtained when all nutrient elements were at the optimum concentration; shortage or excess showed reduced growth but without visible toxicity or excess symptoms. In concentrations below optimum, K reduced growth more than the other elements; N, when varied below and above optimum, resulted in less total growth for the 5 levels than the other nutrients. The nutrient-element balance was disturbed more at $\frac{1}{2}$ times optimum for N, P, Ca, Mn and B than when these were omitted. Excesses of N, P, Ca, Mg, Mn, Fe, B and Zn disturbed the nutrient-element balance in proportion to the extent of the excess.

2274. LALATTA, F.
Influenza dell'epoca della concimazione azotata sul colore dei frutti. **(Effect of date of nitrogen fertilization on fruit colour in peach.)** [English summary 3 lines.]
Riv. Fruttic., 1954, **16**: 50-6, bibl. 10.

In tests on Fogado early peaches in Verona fruit colour was better when nitrogenous fertilizers were applied in late February than when they were applied in the second half of April.

2275. MORETTINI, A.
La concimazione degli alberi fruttiferi con palo iniettore. **(Fertilizing fruit trees with sub-soil injectors.)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 82-8, bibl. 2, illus.

This paper covers the same ground as *H.A.*, 20: 2363. A depth of 30–60 cm. is recommended for deciduous fruit trees and a fertilizer concentration of 15%. The results are given of a recent French experiment in an Algerian citrus plantation.

2276. BOYNTON, D., MARGOLIS, D., AND GROSS, C. R.
Exploratory studies on nitrogen metabolism by McIntosh apple leaves sprayed with urea.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 135-46, bibl. 11.

This series of experiments, conducted at Cornell, confirmed the belief that urea is rapidly absorbed by the underside of apple leaves and indicates that rapid metabolism of urea N in treated leaves and translocation of metabolites away from them occurred. Protein increase was found to be more rapid in young leaves than in older ones, but there was little or no increase of N in the chlorophyll-lipid fraction. Within 4 days of spraying all the water-soluble N fractions with the exception of free ammonia declined from their peak values but were still higher than those found prior to spraying, showing a net gain in protein N.

2277. BLASBERG, C. H.
Response of mature McIntosh apple trees to urea foliar sprays in 1950 and 1951.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 147-53, bibl. 10.

Repeated spray applications of urea to 20-year-old McIntosh apple trees, at 0·75 lb. in 15 gal. per tree at each treatment, gave very large yield increases and enhanced growth and fruit bud development. It is suggested that part of this very favourable response may be due to N assimilation by the leaves augmenting the normal supply of N, which is assimilated by the roots but only slowly translocated at low soil temperatures in early spring. Fruits from urea-sprayed trees were less firm and contained fewer solids than fruits from trees receiving soil application of N. Seasonal fluctuations in total solids were, however, much greater than fluctuations due to treatment. Fruit colour in 1950 was better on trees receiving soil applications, but in 1951 on trees sprayed with urea.

Soil management.

2278. LOEWEL, E. L.
Die Graseinsaat unter Obstbäumen. **(Grass mixtures for orchards.)**
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 90-1.

On the basis of experiments preliminary recommendations are made on grass mixtures to be sown in orchards on two types of soil. Only the German common names of the grasses are given.

2279. KEMP, H. K.
Self seeding cover crops for orchards and vineyards.
J. Dep. Agric. S. Aust., 1954, **57**: 295-9, illus.

Successful winter cover crops for South Australian orchards and vineyards are early varieties of subterranean clover, notably the Bacchus Marsh and Dwalganup strains. An account of the modifications of soil management for successful use of this crop is given.

2280. HITZ, C. W.
Effect of soil management practices upon growth and fruitfulness of peach trees.
Bull. Del. agric. Exp. Stat. **300,** 1954, pp. 29, bibl. 47.
Better peach trees with cover crops.
Circ. Del. agric. Exp. Stat. **28,** 1954, pp. 4.

Twelve combinations of winter and summer cover crops were used in trials with Halehaven peaches begun in Delaware in 1942. All combinations had a slight retarding influence for the first two years after planting, but this effect became less with age. The most favourable system was a double cover one, where soybeans were grown in summer and rye-vetch in winter; all systems using a rye-vetch winter cover gave superior growth. The one in which a winter cover system of rye-vetch was used was considered the most economically sound. Fruiting and fruiting potential were well correlated with tree size and vigour. The second article treats the same subject in a more popular manner.

2281. COUTANT, R., AND PRALORAN, J. C.
Observations préliminaires sur l'influence d'un mulching estival d'une plantation d'abricotiers. **(Preliminary observations on the effect of summer mulching in an apricot plantation.)**
Fruits et Prim., 1953, **23**: 385-8, bibl. 6.

Experiments with 20 species at Aïn-Chaiba Regional Horticultural Station (Morocco), where the summers are particularly hot and dry, failed to indicate a suitable summer cover crop. Accordingly mulching (with mustard grown *in situ* and cut in February), permanent grass and clean cultivation were compared in 1953 in an apricot plantation; in August the soil moisture content was highest under mulch, and lowest under grass. Seasonal data showed that (1) up to the end of April mulching did not improve soil moisture though it reduced variations and thus economized irrigation water despite its consumption by the mustard up to February; (2) from May onward mulch economized water by reducing evaporation and irrigation needs.

2282. Weissenborn, K.
Einfluss der Bodenstruktur auf das Wachstum von Apfelsämlingen. **(The effect of soil structure on the growth of apple seedlings.)**
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 47-51, illus.

In 1929 Wartenberg maintained that the addition of lime to acid, heavy clay soils had a deleterious effect on soil structure and tree growth, a statement that met with severe criticism at the time. The author's pot trials with apple seedlings in a variety of heavy soils poor in humus content have, however, confirmed Wartenberg's results. It is suggested that the pH of such acid soils should be raised gradually to the desired level, preferably by adding a mixture of lime and finely granulated peat.

2283. Gorbatjuk, D. A.
The depth of tillage in orchards. [Russian.]
Sad i Ogorod, 1954, No. 1, pp. 59-61.

On chernozem soils orchard ploughing to 22 and 27 cm. resulted in better growth and higher yields in apple trees than ploughing to 18 cm. The regenerating ability of the roots damaged by deeper ploughing is briefly discussed.

Spraying for cultural purposes.

(*See also* 2216.)

2284. Abbott, D. L.
Recent applications of growth substances in fruit growing.
Ann. appl. Biol., 1954, **41**: 215-20, bibl. 8.

The uses of growth substances for fruit thinning and fruit ripening are surveyed. Results of fruit-thinning tests, although not very encouraging in Britain, show that naphthaleneacetic acid (NAA) can be applied 7 days after petal-fall. Investigations into the working of NAA show that the spray is absorbed by the leaf, and there aggravates an existing deficiency of some factors causing death of the seeds of many fruitlets, which then fall off. Fruit ripening is accelerated by 2,4,5-trichlorophenoxypropionic acid applied to Worcester Pearmain at 40 p.p.m. 6 or 7 weeks before the normal picking date. The fruits contain more anthocyanin, but storage quality is impaired.

2285. Batjer, L. P., and Rogers, B. L.
How to make thinning scientific.
Bett. Fruit, 1954, **48** (9): 9, 13-15, illus.

The commercial possibilities of supplementary size thinning of apples by hand have been investigated in Washington during the past 3 years. It was found that with the help of a tool designed to measure differences in fruit diameter to within 0·01 in. over a range of 0·8 to 4 in. and used in conjunction with values set out in tables for different varieties, ultimate apple size can be determined from 35 days after fullbloom. For example, a Delicious apple having a diameter of 1·33 in. at 50 days from full bloom is likely to need a 163 box size at harvest. ["Box size" refers to the number of apples required to fill a standard North-west apple box.] Predicting apple size is possible because the fruit grows at a more or less constant rate in different orchards irrespective of season, provided the tree has optimum soil moisture, healthy foliage and is exposed to fairly normal weather. Early thinning is recommended to influence fruit-bud differentiation; if, however, reduction in fruit set by chemical sprays has been sufficient to assure adequate bloom for the following season, supplemental hand thinning can be satisfactorily performed over a fairly long period.

2286. Thompson, A. H.
Consideration in the use of chemical thinning sprays on apple trees.
St. hort. Ass. Pa News, 1954, **33** (1): 29-38.

Trials with naphthalene acetamide in Maryland in 1953 showed successful results from applications at rates ranging from 25 to 60 p.p.m. when made between 9 and 16 days after full bloom, depending on variety. The test varieties were Jonathan and Stayman.

2287. Hemphill, D. D.
Spray thinning apples.
Amer. Fruit Gr, 1954, **74** (2): 36-9, illus.

Notes are given on the use of chemicals for apple thinning including the amide derivative of naphthaleneacetic acid, naphthylacetamide. Applications of this new material, commercially known as Amid-Thin, produced the desired thinning effects without causing foliage damage. The limited information available suggests that for best results the treatment should be carried out at petal fall at rates from 30–50 p.p.m., depending on variety.

2288. Lalatta, F.
Indagini sull'alternanza di produzione del melo: mezzi per interromperla. **(A study of biennial bearing in the apple and means of overcoming it.)** [English summary 9 lines.]
Ann. Sper. agrar., 1954, **8**: 575-87, bibl. 1, illus.

The author gives a further account of his experiments with Rosa Mantovana and Annurca in Romagna and Reinette du Canada in Trentino [see *H.A.*, 24: 169]. Conclusions are that regular bearing can be induced by the following treatment in an on year: (1) Chemical thinning by spraying with 20% DNOC at 0·15% just before full blossom and again 3 days later; (2) hand thinning of fruitlets within 3 weeks of full blossom to give a fruit/leaf ratio of 1: 20 to 1: 40; and (3) ringing of the main branches during flowering.—Staz. sper. Ortoflorofruttic., Milano.

2289. Nesdal, O.
Kjemisk tynning av eple. **(Chemical thinning of apples.)**
Frukt og Baer, 1954, **7**: 49-56, bibl. 3, illus.

Blossom and fruit thinning sprays of the hormone and DNOC types were tested at different concentrations on several apple varieties. The responses to the treatments are tabulated and illustrated diagrammatically.

2290. Östlind, N.
Kemisk kartgallring. **(Chemical fruit thinning.)**
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 110-21, bibl. 8, illus.

The results of inconclusive trials on fruit thinning in apples by hormone preparations (1946/51) are discussed. Growers are advised to experiment themselves with 15–25 p.p.m. naphthaleneacetic acid or its salt applied shortly before or shortly after flowering.

2291. WURGLER, W., AND OTHERS.
La lutte contre l'alternance de la fructification des arbres fruitiers par l'éclaircissage chimique. (**Control of biennial bearing in fruit trees by chemical thinning.**)
Rev. romande Agric. Vitic., 1954, **10**: 32-4, bibl. 10.

In experiments on apples and pears at the Lausanne research stations in 1949/53 alpha-naphthaleneacetic acid (2 proprietary products) applied at petal fall or a fortnight later resulted in lighter, better quality crops and had no ill effect on keeping quality. Treatment induced regular bearing in Belle de Boskoop and, in some cases, in Reinette des Reinettes and Reinette de Champagne.

2292. BÖMEKE, H.
Neue Wege zur Erzielung gleichmässigerer Ernten durch Hormonanwendung. (**Hormone treatment for uniform crops.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 115-23, bibl. 2, illus.

Of the hormone preparations tested in 1953 on several apple varieties Shellestone proved most satisfactory for blossom and fruit thinning. At mean temperatures above 15° C. the treatment was always successful, while no results may be expected at 8° C., and applications at intermediate temperatures were moderately successful. Whether applied for blossom or fruit thinning, hormones are, in the author's view, the answer to the problem of biennial bearing. Gravenstein is among the apple varieties for which data are tabulated.

2293. ALLEN, F. W.
The influence of growth regulator sprays on the growth, respiration, and ripening of Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 279-98, bibl. 19, illus.

Five growth substances were sprayed on Bartlett pear trees in California and their effects on fruit ripening, measured by softening, colouring or rate of respiration were observed at harvest time and after storage. In general the materials accelerated ripening. When NAA at 5–10 p.p.m., or 2,4-D at 3–4 p.p.m. was applied for prevention of pre-harvest drop and the fruit was picked early and shipped or stored without delay, accelerated ripening was not always observed. Delay in harvesting or storage did, however, cause premature ripening and breakdown. At ripening temperatures (68–70° F.) the respiration level of sprayed fruit was slightly higher than that of unsprayed. Pears sprayed with parachlorophenoxyacetic acid at 50 p.p.m. were slightly softer at harvest and out of storage than unsprayed ones, but ripening in general was similar to that in unsprayed pears. 2,4,5-TP at 15 p.p.m. and 2,4,5-T at 20 p.p.m. increased softening on the trees, and during ripening sprayed pears had a higher respiration level than unsprayed. When ripe, the treated fruit was more yellow and after ripening developed a rather large percentage of breakdown. Growth measurements made on pears treated with 2,4-D, 2,4,5-T and 2,4,5-TP showed that the materials applied approximately 4 weeks before harvest had no effect on the growth rate or final size of the fruit.

2294. EDGERTON, L. J., AND HOFFMAN, M. B.
The effect of some growth substances on leaf petiole abscission and preharvest fruit drop of several apple varieties.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 159-66, bibl. 9.

In tests at Cornell University, 2,4,5-T and 2,4,5-TP were found to be about equally effective in delaying petiole abscission in McIntosh and some other apple varieties. Application of 2,4-D appeared more effective than NAA in delaying petiole abscission on Early McIntosh and Northern Spy, and 2,4-D was similarly effective in delaying fruit abscission on Early McIntosh. In screening 65 compounds in 1951 only 2,4,5-trichlorophenoxyacetamide was more effective than either 2,4,5-T or 2,4,5-TP in delaying McIntosh petiole abscission and the amide treatment also gave better control of pre-harvest drop than treatment with 2,4,5-T or 2,4,5-TP.

2295. CRANE, J. C.
The effectiveness of 2,4,5-trichlorophenoxyacetic acid in reducing drop and promoting growth of frosted apricot fruits.
Science, 1954, **119**: 383-5, bibl. 5.

In experiments at Davis, California, an application of 2,4,5-trichlorophenoxyacetic acid to apricot trees, varieties Royal and Derby, increased the resistance of the fruits to subsequent low temperatures. The spray was applied 15 hours before a frost, and counts after harvesting showed that sprayed branches dropped 83·9% less fruit than unsprayed and produced 69·7% more fruits with normally developed embryos. The application of 2,4,5-T after a frost was highly effective in preventing drop and promoting growth of damaged Tilton apricots. At harvest all the fruit on unsprayed trees had dropped, but on sprayed trees only 3%, and the fruits, although somewhat misshapen, were of normal size and flavour.

2296. TEUBNER, F. G., Jr.
The induction of plant embryo abortion with naphthaleneacetic acid as a mechanism of hormone thinning of fruit.
Diss. Abstr., 1953, **13**: 942, being *Publ.* 6096 of 225 pp.

In the later stages of apple embryo development abortion or inhibition of embryo development could be induced by plant growth regulators without an accompanying abscission. One of the effects of a thinning spray was the retardation of fruit development, and there was higher ethylene production in retarded fruits. The chemical nature of the natural hormones in developing endosperm tissue was investigated and was shown to have some affinity with the ethyl ester of indoleacetic acid. The activity of the indoleacetic acid oxidase system was greatest in rapidly developing embryos; naphthaleneacetic acid, used as a substrate, was not attacked.

2297. ONO, T., OYAIZU, W., AND SUZUKI, K.
Studies on the reduction of cracking in sweet cherries. (1). [Japanese, with English summary 19 lines.]
J. hort. Ass. Japan, 1954, **22**: 239-43, bibl. 9, illus.

Tests at the Yamanashi Agricultural Experiment Station in 1950/52 showed that 2·5–5·0% calcium caseinate sprays applied 8–14 days and 15 days respectively before picking Napoleon and Rockport Bigarreau greatly reduced cracking due to rain. The caseinate was prepared from the upper clear solution of CaO dissolved in water and it left no visible residue.

Pruning and training.

(*See also* 2322b.)

2298. Renaud, M.
Recherche d'une nouvelle méthode de taille rationnelle des arbres fruitiers à feuilles caduques. **(Development of a new method of rational training of deciduous fruit trees.)**
Arboric fruit., 1954, No. 1, pp. 5-9, illus.

The author gives a fuller account of his new method of training and pruning deciduous stone and pome fruit trees [see *H.A.*, 23: 2630]. The framework of 6–8 branches is created in the first 2 years, the selected branches being allowed to grow on without cutting back till vigorous extension growth ceases after a few years. Only light maintenance pruning is required. When the tree has come into bearing pruning consists of cutting out unwanted new shoots and excess fruiting branches, and cutting back exhausted or over-long fruiting branches. Notes are given on the conversion of trees from other methods of training and on the pruning of stone fruit trees, apples and pears. Advantages claimed for the new method are early bearing, high yield of uniform material, regular bearing, high quality fruit and ease and economy in working.

2299. Roberts, R. H.
Snipping gives old orchards new life.
Circ. Wis. agric. Ext. Serv. **468,** 1954, pp. 4, illus.

Snipping means that all weak branches and branched spurs are cut in half; this treatment invigorates the tree and gives improved yields. Good results have been obtained with Dudley, Duchess, Golden Delicious, Grimes Golden, Jonathan, Northwestern Greening, Red Delicious, Wealthy and Yellow Transparent. The method is not suitable for McIntosh. [See also *H.A.*, 22: 1238 and 23: 253.]

2300. Geljfandrein, P. S.
New principles of training fruit trees and their importance for increased frost resistance and yields. [Russian.]
Sad i Ogorod, 1954, No. 2, pp. 53-61, illus.

Frost damage to fruit trees causing premature ageing and in extreme cases stem splitting is discussed. In the Urals and Siberia suitable apple trees grown in prostrate form have given better results than those grown upright. A new method of training, is recommended, in which the trees resemble free growing horizontal cordons having only a few inches of stem, two main branches 1–1·25 m. long and an abundance of long, upright, easily replaceable fruiting wood. Trees of this shape can be thoroughly sprayed and conveniently pruned. The spacing recommended, 3 m. apart in rows 4–5 m. apart, makes the inter-rows accessible to orchard machinery.

Composition of fruit.

(*See also* 2322h, 3298.)

2301. Bundesanstalt für Qualitätsforschung, Geisenheim.
Der Apfel als Vitamin-C-Träger im europäischen und aussereuropäischen Raum. **(The apple as a source of vitamin C in Europe and overseas.)**
A.R. Bundesanst. Qualitätsforsch. pflanzl. Erzeugn., Geisenheim, 1953/54, pp. 11-13.

Vitamin C contents are tabulated for apple varieties grown in Germany or imported from other countries in Europe and overseas.

2302. Blake, C. E., and Shirley, R. L.
Oxidation, potentials, buffering, ash, and total solids of peaches.
Bot. Gaz., 1953, **115**: 180-5, bibl. 4.

The chemical properties were studied of fruits of several peach varieties grown on sandstone and limestone soils of the Shenandoah Valley, West Virginia. The varieties grown on the sandstone soil had less capacity to reduce an oxidizing agent, and at maturity showed a decrease that was not characteristic of those grown on the limestone soil. Peach varieties grown on sandstone had a slightly greater electrode potential than those grown on limestone, indicating that they were in a higher oxidation state. They showed less ash during the first stages of growth, but essentially the same at maturity, and showed more total solids at all stages of growth. Buffer capacity was greatest between the initial pH and 6·0, least between pH 6·0 and 8·0, and intermediate between pH 8·0 and 10·0: buffering decreased with the approach of maturity.

2303. Bezlur Rahman, M., and Joslyn, M. A.
Die Phenolase und Peroxydase der Pflaumen. **(The phenolase and peroxidase of plums.)** [English summary 1¼ pp.; French and Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 49-62, bibl. 18.

An enzyme preparation containing peroxidase and polyphenolase was obtained from prunes [Agen] and tested for specificity towards phenols and amino phenols. An extract of the natural substrate of the prunes was prepared and qualitatively shown to be similar to chlorogenic acid and caffeic acid. Prune flesh near the pit was found to have the highest enzyme activity and the blossom end was relatively higher in enzyme content than the stem end. Phenolase and peroxidase are both involved in browning of prune extracts, but the relative activity of each varies with the initial relative concentration of extracts and with conditions of testing. [From authors' summary.]

2304. Hulme, A. C.
The isolation of L-citramalic acid from the peel of the apple fruit.
Biochem. biophys. Acta, 1954, **14**: 36-43, bibl. 12.

A method is described whereby a "new" organic acid is isolated from the peel of mature fruits of the Edward VII apple. The characterization of the acid is described and evidence advanced for the view that the acid is L-citramalic acid rather than the isomeric β-hydroxyglutaric acid. An estimation is made of the amount of citramalic acid present in the peel in relation to the amount of malic acid also present. The possible position of citramalic acid in the metabolism of the peel-tissue is discussed. [Author's summary, see also *H.A.*, 23: 3867.]

2305. HARTMANN, A.
Von Mineralstoffen in unsern Früchten. **(The mineral constituents of Swiss fruits.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 123-5.

Data from the book by Heupke and Rost, *Was enthalten unsere Nahrungsmittel?* are tabulated for mineral constituents, calories, excess bases and vitamins of grapes, mahaleb cherry, black currant, cherry, zwetsche, plum, pear, and apple.

2306. COMIN, D., AND SULLIVAN, D. T.
The degree of dissociation of acids in the Rome Beauty apple and its relation to number of days from full bloom.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 299-303, bibl. 4.

An investigation is described on the use of the "index number" (the quantity of dissociated hydrogen per unit of displaceable hydrogen) as a guide to picking maturity in Rome Beauty apples in Ohio. Data are presented showing that the index number rises to a maximum at about 167 days from full bloom. There was a consistent rise in the index number starting about 153 days from full bloom, which is considered as the beginning of the optimum maturity range for this variety. The fact that the degree of dissociation rose to a peak at approximately 167 days from full bloom, irrespective of season or location, affords an index of significant chemical and physical changes taking place in the fruit, but how to use this index to determine exact picking dates in individual orchards needs further research.

2307. HEIMLICH, G.
Untersuchungen über den Reifeverlauf bei Äpfeln. **(Studies on ripening in apple fruits.)** [English, French and Russian summaries.]
Kühn-Arch., 1953, **67**: 266-86, bibl. 24.

(1) Metabolic studies were carried out in 1950 on the fruits of the apple varieties Early Victoria and Oldenburg. (2) N and P values fluctuate during the periods of pre-harvest drop and just before maturity, especially in Early Victoria. (3) Whereas monosaccharides increase steadily until harvest, the starch and pectin content reach their maximum before the fruits are ready to pick. While the fruits are turning from ripe to overripe, the polysaccharides decrease rapidly. (4) In the early developmental stages the pH of apple fruits rises considerably; it then remains unchanged for several weeks to drop again to its low initial value just before harvest. (5) Free acids show a similar curve. (6) During the 1951 season no relationship was discovered between saccharase and amylase content and their substrates in apple fruits. (7) The rapid rise in the activity of the two enzymes in the early stages of fruit development followed by a rapid decline later on is probably related to fruit respiration. (8) The browning of cut apples in the presence of atmospheric oxygen ceases to be reversible a few days after full maturity has been attained. At this stage the discoloration disappears only after the addition of ascorbic acid. (9) An attempt has been made to divide the ripening process into 3 developmental stages. [Translation of German summary.]

2308. HULME, A. C.
The relation between the rate of respiration of an apple fruit and its content of protein. II. The value of the relation immediately after picking and at the respiration-climacteric for several varieties of apples.
J. hort. Sci., 1954, **29**: 98-103, bibl. 8.

Data on the rate of CO_2 production during the climacteric rise in respiration and the rise in net protein content over the same period for a number of early, mid-season and late varieties of English apples are presented. The ratio of rate of respiration to protein content (R/P ratio) at the climacteric peak is found to be high in dessert varieties, especially those maturing early in the season. Within a variety, during several seasons and from different localities, the R/P value at the climacteric peak is shown to be surprisingly constant, provided the respiration climacteric has not proceeded far on the tree before the fruit is picked. [Author's summary, see also *H.A.*, 21: 2304.]

2309. HULME, A. C.
Studies on the maturity of apples. Respiration progress curves for Cox's Orange Pippin apples for a number of consecutive seasons.
J. hort. Sci., 1954, **29**: 142-9, bibl. 3.

The respiration rates are given of Cox's Orange Pippin apples picked over a period from a few weeks before to a few weeks after commercial picking dates, and kept at 12° C. and 15° C.; the rates were measured over several seasons. It is shown that there is a regular biennial variation in the level of respiration. The difference in time between the onset of the respiration climacteric at 12° C. and at 15° C. varies with the picking date, but has a minimal value which varies from season to season. This "minimal gap" may reflect a definite physiological state of the fruit, which could be a guide to absolute maturity in relation to picking for maximum storage life. [From author's summary.]

2310. TAYLOR, O. C., AND MITCHELL, A. E.
Relation of time of harvest to size, firmness and chemical composition of fruit of the sour cherry (*Prunus cerasus*).
Proc. Amer. Soc. hort. Sci., 1953, **62**: 267-71, bibl. 9.

The soluble solids and total solids content of Montmorency sour cherry fruits increased significantly as the harvest period of about 3 weeks progressed. A decrease in the total solids was noted immediately following a rainfall of 1·27 in., after which the total solids accumulation continued until the fruits shrivelled on the tree. The cherries became gradually less firm during the first 2 weeks of the harvest period, and then became rapidly more firm. The average transverse diameter of the fruit changed very little throughout the harvest season.

2311. PEARSON, J. A., AND ROBERTSON, R. N.
The physiology of growth in apple fruits. VI. The control of respiration rate and synthesis.
Aust. J. biol. Sci., 1954, **7**: 1-17, bibl. 9.

Experiments are described which test the hypothesis that the rate of respiration is controlled by the phosphate carrier system in apple tissue. The effects of 2,4-dinitrophenol and adenosine triphosphate on the respiration of cut tissues are consistent with the hypothesis that a more rapid utilization of energy-rich phosphate at a critical stage could result in a climacteric rise. The interrelations of starch, organic acids and nitrogen metabolism and respiration are discussed. An increase in the activity of extracted respiratory enzymes at the time of the climacteric rise has been demonstrated. [Authors' summary.]

2312. MARTIN, D.
Variation between apple fruits and its relation to keeping quality. II. Between-tree variation due to cropping factors.
Aust. J. agric. Res., 1954, **5**: 9-30, bibl. 23.

Storage trials and chemical tests were made from individual trees of plots of apple varieties Cox and Cleopatra. Results from samples picked at successive maturities from light crop and heavy crop trees showed that up to a late stage of maturity light crop fruit had larger diameter, higher acidity, earlier colour changes and later starch conversion than heavy crop fruit; the level of soluble solids in light crop fruit was lower in the earlier stages of maturation but rose faster and might eventually become higher than in heavy crop fruit. Results from samples picked on a standard date in several years indicated a constant correlation between all the above variables (except soluble solids level) and there was evidence that in the changes of maturation at least 3 groups of processes followed independent courses: acid-starch-pressure, colour change, and soluble solids. The highest correlation of the disorder pit was with the mean diameter and acid also seemed to be a consistent factor. There was also extremely high correlation between the disorder breakdown and diameter. The mean fruit diameter per tree is by far the best index of physiological behaviour of the fruit from it. An explanation is suggested in terms of the mean cell size per fruit and respiration per unit protein. There was a physiological interaction between pit and breakdown, each tending to suppress the other, which emphasized the importance of a respiratory phase in the development of pit. [From author's summary. For I, see *H.A.*, 24: 1218.]

Packing and storing.

(*See also* 2200, 2322f, j, q.)

2313. WOODWARD, H. C.
Containers for shipping apples.
Bull. Me agric. Exp. Stat. **521,** 1953, pp. 19, illus.

The behaviour of McIntosh apples packed and transported in various containers was studied. Layer and tray packs, both in wooden and corrugated boxes, were most satisfactory. For rough handling and long distance shipments, the corrugated cell pack gave the best results.

2314. STUCKY, A.
Qualitätsverbesserung beim Mostobst. **(The improvement of must quality in perry pears.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 106-7, illus.

Boxes are preferable to sacks for delivery of pears to the perry manufacturer, since they avoid bruising and loss of juice and disease infection of the sacks returned to the grower.

2315. KRYLOV, M. M., AND ČEKOTILLO, A. M.
Keeping fruit and vegetables in ice stores. [Russian.]
Priroda, 1954, **43** (2): 95-8, illus.

The construction of a store of 250 ton capacity made entirely of ice over a temporary framework and using building material only for the erection of a double entrance is outlined. To prevent thawing in warm weather at Moscow ice stores are covered with insulating material, sawdust, slag with sawdust, moss or peat, to a depth of 0·9–1·0 m. Inside the stores vessels containing iced brine maintain the temperature at about −1° C. The stores are suitable for short-term storage of such perishable products as soft fruits and leaf vegetables and long-term storage of potatoes, root crops, cabbage and pome fruits. Crimean apples and salted cucumbers were stored for 720 and 730 days respectively, with little loss. [See also *H.A.*, 22: 1253.]

2316. BOTTINI, E.
Le malattie da frigorifero dei prodotti ortofrutticoli nei loro riflessi commerciali. **(The cold storage disorders of horticultural products and their commercial consequences.)** [English summary 14 lines.]
Suppl. to *Ann. Sper. agrar.*, 1954, **8** (2), pp. i-xii, bibl. 28.

A number of cold storage disorders of pome fruits, peach, citrus and banana are described briefly. A plea is made for standardization of the nomenclature of such disorders, a full investigation of their causes and the fixing of standards for determining whether fruit and vegetables are in suitable condition for refrigeration.

2317. MONZINI, A., AND GIOVANNINI, E.
Il problema dei prodotti di respirazione delle frutta conservate in celle frigorifere. Nota I. Studi sul potere adsorbente dei carboni vegetali. **(The problem of the respiration products of fruit stored in a refrigerator. Note I. Study of the adsorptive capacity of vegetable charcoals.)** [English summary 12 lines.]
Ann. Sper. agrar., 1954, **8**: 587-92, bibl. 8.

Experiments led to the conclusion that activated charcoals are not the solution of the problem. Charcoal adsorbs acetaldehyde more freely than ethylene. Bromination increases adsorption by 50% or more. Ethylene is more firmly held.—Staz. sper. Freddo, Milano.

2318. TRECCANI, C. P.
Fisiologia della maturazione in rapporto alla conservazione in frigorifero. Influenza dell'epoca di raccolta sulla conservazione e sui caratteri commerciali della mela "Stayman Winesap". **(Physiology of ripening in relation to refrigeration. Effect of picking date on the keeping and eating qualities of Stayman Winesap apples.)** [English summary 16 lines.]
Ann. Sper. agrar., 1954, **8**: 291-330, bibl. 20, illus.

Early-picked Stayman Winesap apples stored at 1–3° C. (R.H. 80–90%) could be kept till mid-January without deterioration in eating qualities or development of bitter pit and scald. Fruit picked at the normal season could be kept till the end of February and late-picked fruit till the end of March. In fruit from the outer part of the crown acidity was lower and total soluble sugars content higher than in fruit from the inside. [See also *H.A.*, 23: 2770.]

2319. McGlasson, W. B.
Fruit storage investigations at the Blackwood experimental cool chambers.
J. Dep. Agric. S. Aust., 1954, **57**: 246-8, illus.

Research on the storage properties of some stone fruits, Williams' pears, Granny Smith apples and Washington Navel oranges was chiefly aimed at discovering suitable export varieties. Results indicated that Goldmine nectarine and Shipper plum are promising and that Williams' pears may be stored successfully at 32° F. in gas for 24 weeks, compared with 14 weeks in air.

2320. Tindale, G. B.
Export of apples? Importance of cool storage.
Fruit World Annual, Melbourne, January 1954, p. 45.

Australian apples could help to fill the shortage of high quality apples in England in March and early April. Shortcomings including short storage life have hitherto ruled out Gravenstein for this purpose but experiments in 1953 show how these can be overcome and how the variety can be given a storage life of 3 months, ample to permit of its successful export. Recommended treatment for export Gravensteins is (1) pick as soon as the typical flavour has developed; (2) cold-store promptly after picking; (3) when cooled to 32–34° F. wrap and pack for export; (4) return to cool chamber whilst waiting for export; (5) transport from cool store to ship's side in insulated trucks to ensure the temperature does not rise above 40° F.; and (6) ship promptly on fast boats at 32–34° F.

By-products.

(*See also* 2322a, i, o.)

2321. Clark, T. F., and Lathrop, E. C.
Nut shells and fruit pits: their composition, availability, agricultural and industrial uses.
[*Publ.*] *U.S. Dep. Agric.* **AIC-352,** 1953, pp. 39, bibl. 63.

The agricultural uses of nut shells and fruit stones include litter, feed, mulch, fertilizer and diluent for insecticidal powders. The numerous industrial uses are discussed under 2 headings, namely, those based on physical and those based on chemical properties.

Noted.

2322.

a Ahlers, N. H. E., and McTaggart, N. G.
The spectroscopic examination of pomegranate-seed oil.
J. Sci. Food Agric., 1954, **5**: 75-9, bibl. 18.

b Bottrell, P. C.
Pruning early apricot trees.
Agric. Gaz. N.S.W., 1954, **65**: 140-4, illus.

c Ceruti, A., and Scurti, J.
Sulla formazione delle gomme nel ciliegio (*Prunus avium* L.). Nota I. Morfologia. Nota II. Istochimica. (**Gum production in the sweet cherry. Note I. Morphology. Note II. Histochemistry.**) [English summaries 12 and 11 lines.]
Ann. Sper. agrar., 1954, **8**: 489-99, illus., 501-18, bibl. 50.

d Chevalier, A.
L'origine des poiriers et pommiers sauvages de nos forêts et la part qu'ils ont prise dans la formation des variétés cultivées. (**The origin of the wild pears and apples of our forests and the part they have played in the evolution of cultivated varieties.**)
Rev. int. Bot. appl., 1953, **33**: 583-5, bibl. 4.

e Chevalier, A.
Les pomacées d'Europe autres que les poiriers et les pommiers et le rôle que leurs fruits a pu jouer dans l'alimentation des anciens hommes. (**Pomaceous species other than pears and apples and their place in the diet of early man.**)
Rev. int. Bot. appl., 1953, **33**: 585-7.
Crataegus, *Mespilus*, *Sorbus* and *Amelanchier*.

f English, R. D.
Moss storage is efficient and easy to run.
Grower, 1954, **41**: 344-7, illus.
As used on a commercial scale for apples, pears and some vegetables.

g Georlette, R.
Contribution à l'histoire de la pomologie: les variétés de fruits d'origine belge. (**Contribution to the history of pomology: fruit varieties of Belgian origin.**)
Ann. Gembl., 1954, **60**: 17-40, bibl. 54.

h Hulme, A. C., and Arthington, W.
Methyl proline in young apple fruits.
Nature, 1954, **173**: 588-9, bibl. 2.

i Koblic, J.
Jablečné odpadky jako nouzové krmivo. (**Apple residues as emergency fodder.**) [Russian and German summaries 11 lines each.]
Sborn. čsl. Akad. zeměd. Věd., Ser. A, 1953, **26**: 587-94, bibl. 13.
Chemical analysis of press residues of apples and pears.

j McCauley, B. G.
Box making methods and costs.
Calif. Agric., 1954, **8** (2): 2, 15-16, illus.
Pear, apple and grape boxes.

k MANARESI, A.
Sull'origine e sulla costituzione genetica dell'albicocco nero ("*Prunus dasycarpa*" Ehrh.). **(On the origin and genetic constitution of the black apricot, *Prunus dasycarpa*.)**
Repr. from *Mem. Accad. Sci. Ist. Bologna*, 1949-50, Ser. X, Vol. **7,** pp. 19, bibl. 45.

l MILIČIČ, D.
Beiträge zur Fruchtanatomie des Pfirsichs. II. Riss- und Wachsbildungen in den Membranen des Epikarps. **(Contributions to the anatomy of peach fruits. II. The formation of cracks and wax in the membranes of the epicarp.)**
Abstracts in *Bull. sci. Cons. Acad. Yugosl.*, 1953, **1**: 83.

m MURAWSKI, H., AND BLASSE, W.
Untersuchungen an autotetraploiden Formen von *Prunus cerasifera* Ehrh I. Morphologische, pomologische und zytologische Untersuchungen. **(A study of autotetraploid forms of *Prunus cerasifera*. I. Morphological, pomological and cytological studies.)**
Züchter, 1954, **24**: 4-11, bibl. 17, illus.

n OLDÉN, E. J.
Växtförädlingsarbeten med äpplegrundstammar. **(Breeding apple rootstocks.)** [English summary 1 p.]
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 40-57, bibl. 27, illus.
At Balsgård.

o ŠKROPIN, P., AND SEDLÁČEK, J.
Stanovení krmmé hodnoty pokrutin z jader peckovitého ovoce. **(The estimation of feeding value of oil-cake from stone fruit seed.)** [Russian and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd., Ser. A, 1954, **27**: 39-52, bibl. 9.

p SOLOVJEVA, M. A.
The conditions for prolonged storage of fruit seeds. [Russian.]
Agrobiologija, 1953, No. 1, pp. 81-93, bibl. 7, illus.
A more detailed account of work published earlier [see *H.A.*, 21: 1356].

q TOMKINS, R. G.
Unsolved problems in the preservation of food: the influence of cultural conditions on the quality and preservation of fruits and vegetables.
J. Sci. Food Agric., 1954, **5**: 161-7, bibl. 19.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 2123, 2132, 2264, 2395b, g, h, i, l, n.)

2323. DARROW, G. M.
***Rubus glaucus,* the Andes blackberry of Central America and northern South America.**
Ceiba, 1952, **3** (2): 97-101, from abstr. in *Turrialba*, 1953, **3**: 195.

Notes are given on *Rubus glaucus* which grows at 6,000–10,000 feet. Its fruits can exceed Boysenberries in size and flavour and have a better appearance as the drupes and seeds are smaller. They are similar to the Youngberry in colour.

2324. WILHELM, S., AND THOMAS, H. E.
Blackberries resistant to wilt.
Calif. Agric., 1954, **8** (1): 8, 12, illus.

A descriptive list is given of trailing blackberry varieties which are resistant to verticillium wilt and can be safely grown in infested soil. These are Black Logan, Burbank Thornless, Cascade, Chehelem, Himalaya, Logan, Mammoth, Merton Thornless, Ollalie, Oregon Evergreen and Phenomenal.

2325. RAMASOMAYAJULU, M. V.
Cape gooseberry (*Physalis peruviana* L.) —a promising bush fruit for the Agency tracts of the Andhra State.
S. Indian Hort., 1954, **1**: 145-7.

Climate and soil requirements in Araku valley (3,000 ft. elevation) together with notes on propagation, culture, cropping and costings.

2326. MANSFELD, R.
Die Obst liefernden Blasenkirschen (*Physalis*). **(Fruit from *Physalis* spp.)**
Züchter, 1954, **24**: 1-4, bibl. 6.

Three *Physalis* species are described of which two, *P. pruinosa* and *P. peruviana*, are recommended for cultivation by amateurs in Germany. Certain improvements, by breeding, are desirable.

2327. NYHLÉN, Å.
Försök med hallon vid Nyckelby, 1944-1952. **(Raspberry trials at Nyckelby, 1944-52.)**
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 79-86, bibl. 4.

In comparative trials Miranda gave considerably higher yields than any of the other varieties tested. Autumn planting was more satisfactory than planting in spring. Steps are being taken in Sweden to overcome the shortage of virus-free planting material for propagation.

2328. REEVE, R. M.
Fruit histogenesis in *Rubus strigosus*. 1. Outer epidermis, parenchyma, and receptacle.
Amer. J. Bot., 1954, **41**: 152-60, bibl. 3, illus.

A description is given of the differentiation of receptacle parenchyma, mesocarp, and the outer epidermis of the normally formed fruit, beginning with floral buds in which the flower organs have been initiated. The material used was Chief, Cuthbert, Lloyd George and other commercial raspberry varieties.

2329. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM.
Einfluss der Stickstoff- und Phosphorsäuredüngung auf einige wertgebende Inhaltsstoffe bei Obst. **(The effect of nitrogen and phosphoric acid manuring on the content of valuable constituents in fruit.)**
A.R. Bundesanst. Qualitätsforsch. pflanzl. Erzeugn. Geisenheim, 1953/54, 1954, p. 14.

N-deficient red currants of the variety Rote Holländer had an ascorbic acid content of 64 mg. % (fresh weight) which dropped to 50 mg. % in the fruits of plants supplied with a high dosage of N. Sugar and total acid content remained unaffected by the manurial treatments. The application of two phosphate fertilizers did not affect the composition of cherries.

2330. COLLINS, W. B.
Strawberry research.
Progr. Rep. Domin. hort. Substat. McDonald's Corner, N.B., 1947-52, pp. 8-13.

The best yielding strawberry varieties grown to date at McDonald's Corner include Senator, Dunlap, Dresden, Premier, Valentine and MacKenzie. Winter mulching studies with oat straw, autumn seeded oats, evergreen boughs, sawdust and shavings have not yet given conclusive results. For rapidly building up the organic content of the soil, manure, peat moss and sawdust gave most promise. Crop rotation studies varying from 3 to 6 years in length have been initiated and ground limestone applications have been made on a 4-year rotation plot. Results of spectrographic analysis indicated that Mg appears to be in low supply in root-rot diseased strawberry plants.

2331. JOHANSSON, E.
Tre nya jordgubbssorter från Alnarp. **(Three new strawberry varieties from Alnarp.)** [English summary 1½ pp.]
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 132-8, illus.

An illustrated description is given of the strawberry varieties Landia, Finn and Julia, recently released by the State Horticultural Research Station, Alnarp; their merits are briefly discussed.

2332. DARROW, G. M.
The Ambato strawberry of Ecuador.
Fruit Var. hort. Dig., 1953, **8**: 53-4, bibl. 3, illus.

In Ecuador a perfect-flowered selection of *Fragaria chiloensis* was seen, growing in cool arid conditions. There are indications that it may have desirable genes for firmness under arid conditions, uniformity of fruit, resistance to red stele, adaptability to short photoperiods and resistance to fasciation. It may also have undesirable genes for dark seed, white flesh, dull red skin and susceptibility to leaf scorch. It is probably not very hardy in northern regions. [See also *H.A.*, 24: 1250.]

2333. RIVOIRE, P.
Le fraisier remontant "Saint Claude". **(The everbearing strawberry Saint Claude.)**
Jardins Fr., 1954, **8**: 9, illus.

The large-fruited, everbearing strawberry Saint Claude yields freely up to the first frosts, is resistant to wet conditions and frost, and is said to be resistant to virus. Its flesh is bright red, sweet, aromatic, and firm enough to stand up to transport.

2334. ROBERTSON, M., AND WOOD, C. A.
Studies in the development of the strawberry. 1. Flower bud initiation and development in early- and late-formed runners in 1951 and 1952.
J. hort. Sci., 1954, **29**: 104-11, bibl. 4.

Early-rooted runners of Auchincruive Climax, Royal Sovereign and Sir Joseph Paxton strawberries, grown near Dundee, began to form flower primordia approximately in early August, early to mid-September and late September respectively. One year a few early Climax runners flowered in autumn. First-year plants of Royal Sovereign formed primordia at the same time as, or slightly before, new runners. Those of Paxton did so 2–3 weeks sooner than their runners. Those of Climax either formed flower primordia in late June and July, the resultant inflorescences flowering shortly afterwards, or grew vegetatively until mid-September, and then began to form inflorescences for the following year. Dates of flowering and numbers of flowers borne varied with the positions of origin of inflorescences on the crown. Inflorescences in small axillary buds seldom reached maturity. [From authors' summary.]—Scottish hort. Res. Inst., Mylnefield.

2335. MYERS, A.
Viability of strawberry seed.
Agric. Gaz. N.S.W., 1954, **65**: 31.

Germination tests with Richmond Red strawberry seed were made over a period of 2 years at Sydney and at Bathurst where the climate has a greater humidity range and is cooler. The seed remained viable over the whole period at both places but the percentage viability after 2 years was much higher at Bathurst.

2336. YAMATO, M., AND OTHERS.
Regional adaptability of strawberry varieties. I. Effects of different climatic conditions in fall and spring on the differentiation and development of flower-clusters and flower buds. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1953, **22**: 153-62, bibl. 5, illus.

Plants raised at 360 m. were grown on at 360 m. and at 3 other elevations up to 1,400 m. Cluster differentiation on main stem laterals took place after that on terminals. At 360 m. in the open differentiation continued until the advent of cold weather and the following spring clusters formed on the terminals of lateral buds of higher orders (2nd, 3rd, etc.), whereas in frames it continued throughout the winter and branches of higher orders (4th and even 5th) bore flower buds. In situations where the cold or snow cover persisted the number of clusters formed was generally small. Yields were correlated with numbers of flowers opened and the latter depended on the number of clusters formed.

2337. SIRONVAL, C.
Un essai de forçage d'hiver de quelques variétés de fraisiers à gros fruits. **(Trials on the winter forcing of some strawberry varieties.)**
Bull. hort. Liège, 1954, **9**: 143-6, illus.

In trials at Liège, 1-year-old strawberry plants were forced under controlled conditions. Plants of 2 early varieties Surprise des Halles and Triomphe de Tihange, 1 mid-season variety Mme Moutot, and 2 late varieties Souvenir de Charles and Pillnitz were kept at 20° C. and subjected to a 16-hr day, starting on 25 October. Harvesting began on 7 December with Triomphe, and continued until the end of January. The colour, taste and appearance of the fruits was good, but their size was small, excepting that of Mme Moutot.

2338. Denisen, E. L., Crandall, P. C., and Doll, C. C.
The influence of summer mulches and runner removal on production of everbearing strawberries.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 235-45, bibl. 3, illus.

Superfection everbearing strawberries at Ames and Council Bluffs, Iowa, received the following spacing treatments: 3-row and 4-row with all runners removed, modified 3- and 4-row with limited runner production, and matted row to form a bed width of 30 in. Sawdust and chopped corncobs were applied as summer mulches to the 3- and 4-row systems only. At Ames, in the year of planting, the late summer crop of the matted row treatment produced only 436 quarts of strawberries per acre, whereas the 3-row system with corncob mulch produced 9,892 quarts. At Council Bluffs spring and summer crops during the second year totalled 8,367 quarts per acre for the matted row and 13,721 quarts for the 3-row system with sawdust mulch. Both types of mulching materials were satisfactory and helped to control broadleafed weeds. In the Ames experiment there were no significant differences between the mulches, but at Council Bluffs slightly higher yields were obtained from the sawdust plots.

2339. Ljones, B.
Den kjemiske samansetnaden av jordbaerblad frå eit faktorielt gjødslingsforsøk. (**The chemical composition of strawberry leaves from a factorial manurial trial.**) [English summary 2 pp.]
Forskn. Landbruk., 1954, **5**: 141-54, bibl. 5.

Strawberry leaf samples were collected on 13 June and 22 July, 1952, from manurial plots receiving 100 g. calcium nitrate, 100 g. potassium sulphate and 200 g. micronized dolomite per sq. m. The most important effects of the various treatments observed in both series of analyses were that (1) calcium nitrate increased N and Mg content, (2) potassium sulphate increased K and lowered Mg content, and (3) dolomite increased Mg and lowered K content. The relationship between manuring and leaf composition is fully discussed and some preliminary conclusions on the effect of individual fertilizers on yield are noted. Symptoms of N deficiency and of Mg deficiency or K excess are briefly described.

2340. Prokofjev, S. D.
To increase strawberry yields. [Russian.]
Sad i Ogorod, 1954, No. 1, pp. 53-7, illus.

In Moscow in the autumn of 1951 one half of a 1 ha. plot was planted with 4 varieties of strawberries spaced 20 cm. apart in rows 80 cm. apart, and the other half was planted with the same varieties in groups of 4 at 12×12 cm., the centres of groups being 80 cm. apart. In both cases 31,200 plants were used, i.e. 62,400 per ha. The group planting was found less laborious than row planting and cultivation around the matted groups was greatly simplified. In 1953 strawberries in the rows produced 63 cwt. of fruit per ha. while those in groups produced 71·6 cwt. and in addition ripened earlier. Other measures recommended for increasing yields are planting of shelter belts in the north and irrigation, particularly in the south. Notes are also given on varieties.

2341. Scott, D. H., and Marth, P. C.
Effect of blossom removal on growth of newly set strawberry plants.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 255-6, bibl. 5.

Removal of blossom from newly set strawberry plants helps more in the establishment of a vigorous planting than almost any other cultural operation. Treatment with 2,4-D, 2,4,5-TP and TIBA did not help.

2342. Denisen, E. L.
Runner inhibition in strawberries with plant growth regulators.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 246-54, bibl. 9, illus.

Foliage sprays of 1,000 and 2,000 p.p.m. of maleic hydrazide applied twice during the summer to Dunlap strawberries, grown in a 3-row system, inhibited runner production and gave significantly higher yields than a matted row check the following spring. Maleic hydrazide at 1,500 p.p.m. caused abnormal flower development in Superfection everbearing strawberries and when applied to the Robinson variety at the time of fruit bud differentiation in the autumn reduced yields in the following season. Dichloral urea at 10,000 p.p.m. killed Superfections, but plants of the spring-bearing Robinsons survived the treatment, produced only 3·3 runners per plant and significantly outyielded the matted row check in production per unit of bed area. Foliar application of 23-21-17 fertilizer did not increase yields of the runner-inhibited plots but did give slight increases in yield in the matted rows.

2343. Reimer, C. A., and Davidson, J. H.
Grow better strawberry plants.
Amer. Fruit Gr, 1954, **74** (4): 14-15, 39-40, illus.

A new system of producing nematode-free strawberry planting stock consists of (1) growing the mother plants in cans, (2) fumigating the plant bed, and (3) setting the cans in the fumigated bed where the runners will grow over the edge of the can and root in treated soil. For the fumigation of plant beds 1 lb. of MC-2 (methyl bromide containing 2% chloropicrin) per 100 sq. ft. applied under a gas-proof cover is recommended. For fumigating large areas before planting, W-85 (containing ⅔ ethylene dibromide) should be applied at 4·5 or 9 gal. per acre with a chisel-type applicator.

Vines.

(*See also* 2196, 2279, 2321, 2395a, c, e, j, k, m, p, q r, t, u, v, w, 3105, 3283, 3314.)

2344. Pratolongo, U.
Le variazioni cicliche della produzione della vite. (**Cyclical variations in vine production.**)
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 483-7, bibl. 4.

Vine production in the commune of Oltresarca in the Trentino from 1773 to 1842 shows a 15–16 years' cycle, coinciding with a cycle of solar activity. There is some evidence of a 32-year harmonic period. The existence of 16- and 32-year cycles is demonstrated in climate as well as in solar and biological activity. [See also *H.A.*, 23: 313.]

2345. Pirovano, A.
Orientamento per la diffusione delle uve da tavola di pregio anche in base alle nuove varietà. **(Notes on new varieties of high quality table grapes.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 403-18, illus.

Notes are given on the commonest table grape varieties and on new early, midseason and late varieties and those which store well.

2346. Seventh International Congress on Vines and Wine.
Rapport nationaux présentés au congrès. Viticulture. Raisins de tables. **(National reports on table grapes presented to the 7th International Congress on vines and wines.)**
Bull. Off. int. Vin, 1954, **27** (277): 30-94.

Separate reports in French are given on the organization and problems of table grape production in the following countries: Spain, France, Greece, Israel, Italy, Luxemburg, Morocco and the Netherlands.

2347. Canitano, D.
Le uve da tavola nei problemi della produzione e della esportazione. **(Table grapes: problems of production and export.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 420-36.

Topics discussed include the eradication of defects in production and export (inadequate supplies of early and late varieties, excessive number of varieties, poor presentation in foreign markets), the situation in the main foreign markets which are Germany, England, Switzerland and Austria, the chief Italian centres of production and export, viz. Bari, S. Benedetto, Pisa and Bologna, control of quality of export table grapes by the National Institute for Foreign Trade, stimulation of home and foreign consumption by price reduction. Recommended varieties for different production areas are listed.

2348. Aldebert, —., Frézal, P., and Diry, —.
Raisins de table. Amélioration variétale des cépages, des méthodes culturales et de protection contre les maladies. Algérie. **(Table grapes: improvement of varieties and of cultural and disease control methods. Algeria.)**
Bull. Off. int. Vin, 1954, **27** (276): 47-86.*

Table grapes cover only 6,700 ha. out of a total of 400,000 ha. under vines in Algeria and the law prohibiting the creation of new vineyards prevents the extension of the area. Dual-purpose varieties such as Cinsaut and Clairette pointue compete with midseason table grapes and attention is therefore concentrated on the production of early and late table varieties. Notes are given on the improvement of the early variety Chasselas by mass and clonal selection and of the late Valensi and "native varieties", particularly Ahmar-bou-Ahmar. Protection against climatic factors, physiological disorders, pests and diseases is discussed and an account is then given of the techniques used in growing Chasselas, the midseason Muscat of Alexandria, and Ahmar-bou-Ahmar.

2349. Birk, H.
Raisins de table. Amélioration variétale des cépages, des méthodes culturales et de protection contre les maladies. Allemagne. **(Table grapes: improvement of varieties, of cultural methods, and of protection against disease. Germany.)**
Bull. Off. int. Vin, 1954, **27** (276): 87-95.*

The objects of varietal improvement are better quality and increased yield. In clonal selection a combination of the early Riesling × Sylvaner with French and Italian early varieties has given new crosses superior to the standard Chasselas; the best of the new crosses are listed. The use of the rootstock Troll × Riparia 26 G generally ensures satisfactory yield and improved adaptability even in bad seasons in Southern Germany. Improved methods of cultivation and protection are discussed. A list of early, midseason and late varieties for outdoor cultivation, and of glasshouse varieties is given.

2350. Maxwell, N. P.
Vinifera grape maturity in the lower Rio Grande Valley in Texas.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 74-8.

The growing of vinifera grapes is attracting increasing interest in this area on account of their extreme earliness. Figures for total solids and flavour assessments of 13 varieties indicate their dates of maturity (early May to mid-July). Perlette and Thompson Seedless are considered to have the greatest commercial possibilities. Cotton root rot is a problem.

2351. Breider, H.
Neue Rebsorten im fränkischen Weinbau. **(New vine varieties for Franconia, Germany.)**
Dtsch. Weinb., 9 Jan., 1954, p. 13, from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 142-3.

Two new vine varieties have been released after many years of breeding work and testing, Mainriesling (Sylvaner × Riesling) and Perle von Alzey (Gewürztraminer × Müller-Thurgau). Their merits include early wood and fruit maturity in one variety and some resistance to spring frost in the other. A new vine rootstock has also been released.

2352. Biron, M.
Syrah, dans le Moyen Orient. **([The vine variety] Syrah in the Middle East.)**
Progr. agric. vitic., 1954, **141**: 241-4, illus.

Notes are given on the very ancient variety Syrah which is being tested in the Middle East. It is used in the making of Côte-du-Rhône and Châteauneuf-du-Pape wines in France.

2353. Breviglieri, N., and Ricasoli, B.
Osservazioni su alcuni vitigni coltivati a Brolio in Chianti. **(Notes on some vines cultivated at Brolio in Chianti.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 513-28, bibl. 2, illus.

Yield and other data for 1934/51 are given for the varieties used in making Chianti wine and for some other varieties.

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* Being report presented at the VIIth International Vine and Wine Congress, Rome.

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2354. Valat, C.
Les roussettes. L'Altesse et La Marsanne. **(The russet vines. Altesse and Marsanne.)**
Progr. agric. vitic., 1954, **141**: 182-5, illus.

Russet is the term for certain white varieties whose grapes are russet coloured when ripe and for the wines they produce. A description is given of Altesse which is confined to the Chautagne area and of Marsanne which is grown all along the French Rhône.

2355. Gobbato, C.
La coltura della vite e l'industria del vino nel Rio Grande del sud (Brasile). **(Viticulture and the wine industry in southern Rio Grande, Brazil.)** [English summary 5 lines.]
Riv. Agric. subtrop., 1954, **48**: 10-20.

In the state of Rio Grande do Sul, the chief vine-growing centre of Brazil, the area of vineyards is 28,000 ha., the number of bearing plants (commonest variety Isabella) is 14 million, and the yield (mainly used for wine making) is 200,000 tons.

2356. Schwarzenbach, H.
Rebfläche und Weinerträge in der Schweiz. **(Areas of vine growing and wine yields in Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 104-5.

The total area under vines in 1953 amounted to nearly 13,400 ha. Since 1946 the area under vines has decreased in eastern and northern Switzerland and increased in the southern and western parts of the country.

2357. del Giudice, E.
Presente e avvenire della viticoltura della Sicilia occidentale in relazione alle nuove esigenze della industria enologica. **(The present position and the future of vine growing in western Sicily in relation to the new requirements of the wine making industry.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 199-219, maps.

Statistics of vine area and yields are given for Sicily as a whole. Government measures taken in Sicily between 1947 and 1952 have included the inauguration of a vine and wine course of studies at the Istituto Tecnico Agrario of Marsala, enactment of laws for the protection of Marsala and the muscatel of Pantellaria, the establishment of vine and wine agricultural districts, of a regional institute for vines and wines and of an experimental wine centre. Rootstocks and scion varieties are discussed. The author's recommendations are that western Sicily should produce all the Marsala—which must be of high quality—, that the Italian and the foreign markets will accept, and that the aim in the rest of Sicily should be abundant production of different types of produce, especially light wines, dinner wines and dessert grapes. Two maps show the zones in which the different wines are produced and the location of monoculture vineyards.

2358. Alagna, N.
Viticoltura siciliana: vecchia e nuova. **(Sicilian viticulture: old and new.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 185-93.

Notes are given on vine growing in the 3 regions of production: the western (Trapani-Palermo-Agrigento), the eastern (Messina-Catania), and the south-eastern (Syracuse-Ragusa). A problem in western Sicily is the fall in the demand for Marsala.

2359. Cosmo, I.
Possibili miglioramenti della viticoltura e dell'enologia nelle provincie di Udine e di Gorizia. **(Possible improvements in vine growing and wine making in the provinces of Udine and Gorizia.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 57-75.

Choice of rootstock, wine and table varieties. On dry sites the rootstock variety 420A should replace Kober 5 BB which is susceptible to drought and in Gorizia it should replace Rupestris du Lot which induces a tendency to berry drop and is more susceptible to infectious degeneration. Varieties suitable for red and white wine production are listed. As regards table grapes the most likely improvement lies in better organization of marketing. *Cultural practices.* Monoculture (with intercropping if desired) is preferable to permanent mixture with other crops and more attention should be given to spacing, training and pruning, preparation of the soil, manuring, and control of downy and powdery mildews.

2360. Bianchedi, A., and Serena, G.
Il problema viti-vinicolo della marca trevigiana. **(The vine-growing and wine-making problem in the Treviso district.)**
Agric. Venezie, 1954, **8**: 231-64.

On the basis of a recent census the Treviso district is divided into 3 vine-wine regions, namely the white wine hill zone in the north (mainly Riesling and Prosecco), the European red wine zone in the east and south-east (Merlot, Cabernet, Raboso Veronese and Raboso Piave), and the zone of the Clinton and other hybrid direct producers in the west and south-west. To obtain better prices for the wine, control on the basis of locality or source of origin is necessary. Census data are given.

2361. Bolgarev, P. T.
The manifestation of polarity. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 1, pp. 46-50, bibl. 6.

A brief general review of polarity is followed by a discussion on its utilization in viticulture. Among the favourable effects of polarity in vines are: ease of rooting of cuttings, deep root penetration and free branching, rooting of horizontal layers and increased growth of laterals when the main shoots are pinched back. Unfavourable effects include uneven bud development along the branches and its effect on fruiting, flower drop caused by excessive vegetative growth, and uneven callusing of rootstock and scion resulting in bad graft union.

2362. Zimmermann, J.
Sprosshistologie und Holzreife bei der Rebe. **(Histology of the shoot and wood maturity in vines.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. A, 1954, **4**: 101-19, bibl. 18, illus.

A study has been made of the effect of the histological and physiological condition of the wood on the "take" in vine grafting. The climate from the beginning of the season to the lignification of the shoots was found to determine the histological composition of the wood and that during the autumn to decide the degree of wood maturity. After discussing the development of each tissue in turn the author concludes from his observations that success in grafting depends on a favourable pith/wood ratio, the uniform development of the bast and a favourable starch/sugar ratio. The water content of the shoot is a good indicator of the maturity of the wood; if it exceeds 47%, results are likely to be poor.

2363. Breider, H.
Die Röntgendiagnose in der Rebenzüchtung. **(The use of radiographs in propagation of vines.)**
Züchter, 1954, **24**: 17-20, bibl. 7, illus.

The author's earlier work had shown that success in vine grafting depends largely on a favourable wood/pith ratio in rootstock and scion and that radiographs are a simple means of determining this feature.* Some figures on the percentage of "take" following selection of the material by X-rays are recapitulated in the introduction. The present paper discusses the application of the X-ray technique in breeding work on rootstocks and for other purposes, such as the diagnosis of court-noué [*H.A.*, 23: 2714].

2364. Klein, S.
Some aspects of metabolism in rooting of vine cuttings.
Palest. J. Bot. (*J*), 1953, **6**: 114-19, bibl. 7.

Cuttings from different parts of two varieties of *Vitis vinifera*, 41 B Chasselas-Berlandieri and 1202 Mourvèdre-Rupestris, were examined for their rooting capacity, sugar and starch content and osmotic value. 41 B showed a significantly lower rooting than 1202. No correlation could be found between root-forming capacity and sugar or starch content. In both varieties root-forming capacity of cuttings taken from the basal and middle parts of clones showed inverse correlation with osmotic values. [Author's summary.]

2365. Harmon, F. N., and Snyder, E.
Scion roots of grafted vinifera grapes.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 205-8, bibl. 3, illus.

Records taken at Fresno, California, showed that where the graft unions were above soil level no scion roots developed. Where the graft unions were at soil level or below, yearly removal of scion roots appeared necessary as their presence reduced the size of the rootstocks. More scion roots were found on the weakest of 3 rootstocks observed, Salt Creek, than on the two more vigorous ones, Solonis × Othello No. 1613 and Rupestris St. George.

2366. Zuluaga, P. A.
Consideraciones sobre "afinidad" de variedades viníferas con porta-injetos americanos. **(Compatibility of vinifera varieties with American rootstocks.)** [English summary 1 p.]
Bol. téc. Univ. nac. Cuyo **2,** 1953, pp. 34, bibl. 9.

Scion and stock effects and response to environment were studied in numerous combinations of the 5 vinifera scion varieties, Pedro Giménez, Malbeck, Pinot Blanco, Cabernet and Bonarda, most commonly grown in Argentina, with 18 rootstocks under widely differing ecological conditions in 4 localities. It was concluded that variety of scion or stock has little or no influence on compatibility (affinity) and that environment is the principal factor determining the success or failure of a combination.

2367. Capucci, C.
Problemi di ricostruzione viticola in provincia di Forli con particolare riferimento al Riminese. **(Vineyard reconstruction problems in the province of Forli with special reference to the Rimini district.)**
Problemi di ricostruzione viticola in provincia di Ravenna. **(Vineyard reconstruction problems in Ravenna.)**
I sistemi di allevamento della vite in provincia di Bologna. **(Vine training systems in Bologna.)**
Repr. from [*Publ.*] *3ª Settimana Aggiorn. Tec. agric.*, Bologna, 1952, pp. 14.
Alcuni accorgimenti atti a migliorare l'ancoraggio dei sostegni nei vigneti alti di pianura e di piano-colle. **(Means of improving the anchorage of supports in high-trained vineyards on the plains and plateaux.)**
Repr. from *Gen. rur.*, October 1951, Vol. **14**, No. 5, pp. 7, bibl. 2, illus.
L'alberata cesenate. Disposizione dei sostegni e delle viti, allevamento e potatura delle piante. **(The Cesena system of growing vines on living supports. Arrangement of supports and vines, training and pruning.)**
Repr. from *Gen. rur.*, February 1953, Vol. **16**, No. 1, pp. 12, bibl. 9, illus.

These 5 papers are all concerned with training systems, varieties and rootstocks for use in vineyard reconstruction in northeastern Italy. The systems in question are (1) low (alberello and Guyot), (2) high (capovolto, pergola and ray), and (3) on live supports (alberata cesenate, alberata romagnola piena and ray).

2368. Gavrilkevič, B. B.
Full yield from vines in the third year from planting. [Russian.]
Agrobiologija, 1953, No. 3, pp. 160-1.

Near Odessa a full harvest of 6·7 tons per ha. was obtained in the 3rd year from planting by careful selection of varieties and individual plants, correct cultivation, disease control, and pruning in the first year to 2–3 buds, in the second to 4–8 and in the third to 14–28.

2369. Edgerton, L. J., and Shaulis, N. J.
The effect of time of pruning on cold hardiness of Concord grape canes.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 209-13, bibl. 7.

When in the spring of 1950 canes from autumn-pruned and unpruned vines were exposed to −16° F., slightly more injury occurred in the pruned than in the unpruned samples. The low temperature killed many primary buds, whereas the secondary and tertiary buds were hardier. In 1952 exposure to −14° F. did not affect the canes greatly. Some injury to the primary buds did occur, however, the percentage of survival being slightly lower in samples taken from the tips of the pruned canes. Exposure to −22° F. killed practically all primary buds, but the canes from unpruned vines and from the base of autumn-pruned vines suffered little injury at that temperature.—Cornell Univ.

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* *Dtsch. Weinbau*, 1953, Heft 14 and 21; *Landw. Jb. Bayern*, 1953, Heft 9/10.

2370. Tkačenko, G. V.
Frost resistance of vine buds. [Russian.]
Sad i Ogorod, 1954, No. 1, p. 65.

A note of warning against pruning vines too severely after very cold winters, based on laboratory observations at Užgorod, Transcarpathia, where it was found that the first [lowest] bud on each shoot was the most susceptible to frost damage and the sixth or ninth, depending on variety, the most resistant.

2371. Shaulis, N., and Robinson, W. B.
The effect of season, pruning severity, and trellising on some chemical characteristics of Concord and Fredonia grape juice.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 214-20, bibl. 14.

Examination of grape juice samples obtained from vines grown in New York have shown that variations between seasons affect the date of maturity (16° Brix) more than pruning severity or trellis height. Moderate pruning to 40 buds, which is recommended for Concord, resulted in a yield increase with no delay in maturity or appreciable change in amount of colour, total acid or methyl anthranilate as compared with severe pruning to 30 buds. Light pruning to 50 buds produced a larger crop, but tended to delay maturity and reduce the total acid content of the juice. Low trellising delayed maturity, but at 16° Brix did not appreciably affect composition. In general balanced pruning to 40 buds with vines trained on 5½ ft. trellises is considered satisfactory.

2372. Shaulis, N., Kimball, K., and Tomkins, J. P.
The effect of trellis height and training systems on the growth and yield of Concord grapes under a controlled pruning severity.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 221-7, bibl. 5.

Vine size, as indicated by pruning weights of moderately pruned Concord vines over 4 years, increased under all 3 training treatments, but pruning weights were significantly lower with the Umbrella system than with either the 4-arm Kniffin or the Keuka systems. Yields were not significantly affected by the training systems except during the last year of observation when the Keuka-trained vines produced lower yields than the Umbrella-trained. High, 6 ft. trellising resulted in both heavier pruning weights and higher yields than low, 4½ ft. trellising.

2373. Hamilton, J.
The effect of cluster thinning on maturity and yield of grapes on the Yuma Mesa.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 231-4, bibl. 2.

In a 2-year experiment in Arizona, Thompson Seedless vines thinned to 12 clusters per vine reached legal maturity (17% soluble solids) 3 or 4 days earlier than vines thinned to 16 to 24 clusters. Yield was reduced in close proportion to reduction of the number of clusters per vine.

2374. Vettori, M.
Nota sulla concimazione della vite guidata dalla "diagnostica fogliare". **(Note on vine manuring based on leaf analysis.)**
Riv. Vitic. Enol., 1954, **7**: 3-11, bibl. 8.

An account is given of a French method (evolved by Lagatu, Maume, Dulac and Bouat) of vine leaf analysis. The leaves used are the first 2 at the base of fruiting shoots of healthy plants and material is taken four times during the season, namely at the beginning and end of flowering and at colouring and maturation of the fruit. The ideal contents of N, P_2O_5 and K_2O at the beginning of flowering and at fruit maturation and the ideal $N/P_2O/K_5O_2$ ratio are given and the method of graphical representation of data is described.

2375. Peynaud, E., and Maurié, A.
Sur l'évolution de l'azote dans les différentes parties du raisin au cours de la maturation. **(On the formation of nitrogen in different parts of the grape during ripening.)**
Ann. Tech. agric., Sér. E, 1953, No. 1, p. 15, from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 141.

Detailed analyses showed that during ripening the content of nitrogenous substances rises in the pulp and skin of the grape, while in the seed proteolysis occurs long before maturity. Thus, the seed gives off about one-fifth of its nitrogen to the pulp as NH_4. A relation was found to exist between titratable acids in the ripening fruit and its amino acid content.

2376. Kolesnik, L. V.
The effect of fertilizers on the development of dormant buds of vine. [Russian.]
Agrobiologija, 1953, No. 6, pp. 123-6, bibl. 10.

For the maximum development of inflorescences in dormant vine buds the inclusion of phosphorus in the previous season's fertilizer application is recommended.

2377. Luque, J. A.
Consumo y distribución del agua de riego en la vid. **(Consumption and application of irrigation water in the vine.)**
Bol. téc. Univ. nac. Cuyo **4**, 1953, pp. 30, bibl. 13, illus.

An account is given of a study of furrow irrigation of vineyards in south Mendoza Province. The most suitable and widely employed method is the sub-division of the irrigation area into 4 sectors and the application of water 8 times per sector per annum. The interval between successive irrigations in any given sector is 32 days, except during harvesting and dormancy, and the total amount per irrigation is about 600 cu.m. per ha., or about 5,000 cu.m. per ha. per annum. Taking the 4 sectors together the interval between successive irrigations during the irrigation period (about 240 days) is 8 days.

2378. Benvegnin, L.
Influence du prélèvement de raisin de table sur la qualité du moût. **(Effect of early picking of table grapes on the quality of the must.)**
Rev. romande Agric. Vitic., 1954, **10**: 23-5.

The practice of picking selected bunches for eating purposes before the normal date of harvesting for wine making is becoming increasingly common. Experiments in 1950 to 1953 with Chasselas showed that picking some bunches a fortnight or more before the main harvest had no deleterious effect on the quality of the wine.

2379. WEAVER, R. J.
Effect of benzothiazol-2-oxyacetic acid in delaying maturity of grapes.
Science, 1954, **119**: 287-8, bibl. 2.

Four- and five-year-old vines of the Red Malaga, Tokay, Ribier, Zinfande and Thompson Seedless varieties were sprayed with benzothiazol-2-oxyacetic acid soon after the shatter of berries following flowering. The result was delayed maturity, with a decrease in the percentage of total soluble solids and an increase in the percentage of acid. The size of the treated berries was reduced, but this could probably be overcome by using lower concentrations or later applications of the compound.

2380. DÜHR, —.
Versuche mit Wuchsstoffen zur Verhinderung des Durchrieselns. **(Experiments with growth substances for the control of coulure.)**
Dtsch. Weinb. wiss. Beihefte 7, 1953, pp. 159-61, from abstr. in *PflSch. Ber. Wien*, 1954, **12**: 67-8.

Results varied a great deal with the preparations and concentrations used. The application of growth substances for the control of fruit drop in vine, it is concluded, is still in the experimental stage.

2381. STEINGRUBER, P., HARTMAIR, V., AND MÜLLNER, L.
Über das Durchrieseln der Reben unter besonderer Berücksichtigung des Wuchsstoffproblems. **(Coulure in vines, with special reference to growth substance treatment.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, *Ser. A*, 1954, **4**: 120-4, bibl. 14.

Following a discussion of the causes of coulure the authors give a preliminary account of their own experiments in which they tested various specified solutions on affected plants. None of the treatments reduced the trouble, but the results obtained so far emphasize the importance of timing growth substance applications, to which open flowers appear to be more responsive than either buds or rudimentary, parthenocarpic berries. The selection of scion wood should be carried out under environmental conditions which favour coulure so as to avoid transmitting the trouble unnecessarily in propagation.

2382. PENMAN, F., AND OLDHAM, F. S.
Drying of vine fruits.
J. Dep. Agric. Vict., 1954, **52**: 57-67, illus.
J. Dep. Agric. S. Aust., 1954, **57**: 223-33, 248, illus.

Vine fruits grown in Australia for drying are sultanas, currants and gordos (Muscat Gordo Blanco). Small quantities of Waltham Cross grapes are dried as raisins. The time of harvesting must be carefully calculated to obtain a high sugar content in the grape and at the same time allow sufficient drying time. Sultanas are dried by three main methods, the cold dip, the mixed dip and the sulphite dip; these three are discussed and described in detail. Currants are dried on racks without being treated in any way. A caustic soda dip is used for gordos. Table raisins are now dehydrated in packing sheds, and very few are sun-dried. The construction of drying racks is fully described.

2383. WILLIAMS, A. E.
The use of iodine in fruit packing.
Comm. Gr, 1954, No. 3043, p. 902.

The results of trials in several countries are summarized. The use of iodized wraps has decreased mould growth on stored grapes, oranges, melons and passion fruit. Their use on some peach and plum varieties has been less successful and has caused abnormal ripening. With tomatoes iodized wood shavings were better than iodized paper wraps.

2384. MALAN, H.
Long-term storage of grapes.
Fmg S. Afr., 1954, **29**: 157-9, bibl. 2.

Waltham Cross grapes were stored successfully for 3 months at 31° F. in an atmosphere containing 20 p.p.m. sulphur dioxide; fungal waste is not a problem under good storage conditions. No significant difference was found in keeping quality between grapes grown in various areas.

Nuts.

(*See also* 2395d, f, o, s.)

2385. GAGNARD, J.
Le problème de la pollinisation chez les principales variétés d'amandiers cultivés en Algérie. **(The problem of pollination in the principal varieties of almond cultivated in Algeria.)**
Fruits et Prim., 1954, **24**: 20-32, bibl. 29, illus.

The 10 almond varieties studied, all self-sterile, fall into 2 inter-compatibility groups, one of 8 and one of 2 varieties. In some, pollination is greatly influenced by the weather during flowering. Recommendations are made for mixtures of 2 or of more than 2 varieties. An inter-pollination chart is included.

2386. HAMMAR, H. E., SMITH, C. L., AND ALBEN, A. O.
Boron uptake as a criterion of the root spread of pecan trees.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 131-4, bibl. 5.

Leaf analysis and toxicity symptoms showed that cross-feeding occurred in pecan trees spaced 55 ft. apart and closer, when borax was applied at the rate of 10 to 11 lb. per tree on sandy soils and 100 lb. per tree on heavy clay soil. The data on boron uptake indicate that it is advisable to use guard trees in pecan fertilizer experiments with 20-year or older trees unless they are spaced more than 60 ft. apart. Scorching of foliage was observed on trees receiving borax at 10–11 lb. on light and 100 lb. on heavy soils, and on the sides of adjacent trees nearest to treated trees. Application of borax at 20 lb. per tree in heavy soils caused no boron injury nor did it result in boron uptake by adjacent trees growing 50 or 60 ft. from one another.

2387. **Sharpe, R. H., Blackmon, G. H., and Gammon, N., Jr.**
Relation of potash and phosphate to cold injury of Moore pecans.
Bett. Crops, 1954, **38**: 17-18, 48-9, illus.

Reduction of winter injury to Moore pecan trees resulted from potash fertilization under conditions of low potassium supply. No important relation to previous superphosphate treatment was indicated. Leaf potassium was found to be related to treatment and to extent of injury. Foliage injury from aphids and scab and late growth maturity were factors predisposing the trees to injury. [Authors' summary. See also *H.A.*, 24: 1291.]—Fla agric. Exp. Stat., Gainesville.

2388. **Woodroof, J. G., and Heaton, E. K.**
"Year round on pecans" by refrigerated storage.
Food Engng, 1953, **25** (5): 83-5, 141-2, from abstr. in *Fruits d'Outre Mer*, 1953, **11** (2), suppl. *Fruits trop. subtrop.*, No. 11-6711.

Pecan nuts keep well for up to 2 years when stored at 0° C. and 68% R.H.

2389. **Zohary, M.**
A monographical study of the genus *Pistacia*.
Palest. J. Bot. (*J*), 1952, **5**: 187-228, bibl. 22, illus [received 1954].

The genus is treated under headings which include geographical distribution, genus subdivision and enumeration, cytology and lines of evolution.

2390. **Scott, R. A.**
Fossil fruits and seeds from the Eocene Clarno formation of Oregon.
Diss. Abstr., 1953, **13**: 647, being *Publ.* 5727 of 121 pp.

A new species of walnut (*Juglans*) is the dominant form among fossil fruits and seeds found in an Eocene formation in Oregon. This is the first walnut fruit known with certainty from rocks as old as Eocene and it shows that the fruits of walnut and hickory (*Carya*) were generically distinct at that time. The flora indicates humid sub-tropical conditions.

2391. **Serr, E. F.**
Rooting Paradox walnut hybrids.
Calif. Agric., 1954, **8** (5): 7, illus.

Preliminary trials at Davis, California, indicate that trench layering is a promising method of propagation for walnuts. Five Paradox seedlings planted in March in a 6-inch deep trench were pegged down when growth started. The trench was filled with a potting mixture during growth so that the soil level was just below the growing tips. After 1 season's growth the shoots averaged 40 inches in height, and there were about 4 roots to each shoot.

2392. **Stritzke, S.**
Grundlagen für eine erfolgreiche Ausweitung des Walnussanbaues in Mitteldeutschland. **(The extension of walnut growing in central Germany.)**
Arch. Gartenb., 1953, **1**: 407-16, bibl. 2, illus.

Vegetative propagation and pollination are among the subjects discussed. A chart shows the blossoming period of male and female flowers in selected parent trees.—Inst. Gartenb. Dresden-Pillnitz.

2393. **Ščepotjev, F. L.**
Metaxenia of the walnut. [Russian.]
Agrobiologija, 1953, No. 1, pp. 110-12, illus.

In the Ukraine 2 walnut varieties pollinated with *Juglans mandshurica* produced some nuts resembling those of the pollinator. They were larger than the normal fruits or those borne by the male parent.

2394. **Ščepotjev, F. L.**
Pollination with mixed pollen in the distant hybridization of walnut. [Russian.]
Agrobiologija, 1953, No. 4, pp. 142-4.

Isolated flowers of 2 walnut trees cross-pollinated with mixed pollen of *Juglans mandshurica* and *J. cinerea* produced a higher percentage of hybrid nuts than when cross-pollinated with the pollen of either species alone.

Noted.

2395.

a **Blaha, J.**
Ceskoslovenská ampelografia. **(Czechoslovakian ampelography.)**
"Orac," Robnicke Vydavatelstvo, Bratislava, 1952, pp. 361, illus., from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 95.
Illustrated descriptions of varieties, direct producers and rootstocks, with analytical data on wines.

b **Dermott, W.**
The manuring of fruit. 3. Soft fruit.
Agriculture, Lond., 1954, **60**: 584-6.

c **Dobrovoljskiĭ, A. N.**
Selection of a medium for germinating vine pollen. [Russian.]
Agrobiologija, 1953, No. 1, pp. 67-75, bibl. 6, illus.

d **Forester, M. B.**
Improved varieties of black walnuts for West Virginia.
A.R. W. Va agric. Exp. Stat. 1952/1953, issued as *Science serves your farm*, *Bull.* **363**, part 1, 1953, 3, 6, illus.
Four varieties compared: Thomas, Ohio, Stabler and Ten Eyck.

e **Francot, P., and Maury, P.**
Remarques sur le mode d'épandage des engrais dans le vignoble champenois. **(Methods of fertilizer application in the vineyards of Champagne.)**
Vign. champ., 1953 [?], **73**: 341, illus., from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 96.

f **Honda, N., and Okazaki, M.**
Root development of chestnut trees in relation to edaphic conditions. (III.) Observations made in Hirusen district (Ando-soil Zone), Okayama Prefecture. [Japanese, with English summary 1½ pp.]
Sci. Rep. Fac. Agric. Okayama Univ., 1953, No. 3, pp. 8-21, bibl. 24, illus.

g KRAUSE, W. G. C.
Methods to increase the yield of forced strawberries.
Comm. Gr, 1954, No. 3040, pp. 729-31.
Economic strawberry forcing by Dutch and Belgian methods.

h KROKAN, O.
Bringebaer og bringebaerdyrking. **(Raspberries and their cultivation [in Norway].)**
Frukt og Baer, 1954, **7**: 3-14, illus.

i KRONENBERG, H. G.
Two-crop strawberry production in Holland.
Amer. Fruit Gr, 1954, **74** (4): 13, 36-7, illus.
See also *H.A.*, 20: 107.

j MARSANO, M.
La vitivinicoltura nel Goriziano. **(Vine growing and wine making in Gorizia.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 112-22.

k MAZZEI, A.
Il presente e l'avvenire della viti vinicoltura della Sicilia centro-orientale. **(The present position and the future of vine growing and wine making in east-central Sicily.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 261-82.

l MEYERS, T., AND SAMUELS, J. K.
Buyer preference for cranberry packaging in Boston and Topeka.
Market Res. Rep. U.S. Dep. Agric., Bur. agric. Econ. **34,** 1953, pp. 14.

m MÜLLNER, L.
Neue Wege in Düngung und Bodenpflege. **(New methods of [vine] manuring and soil cultivation.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. A, 1954, **4**: 58-71, bibl. 14, illus.
A review.

n OVERCASH, J. P.
Breeding raspberries for Mississippi.
Miss. Fm Res., 1953, **16** (12): 5.

o PEASE, R. W.
Growing chestnuts from seed.
Circ. W. Va agric. Exp. Stat. **90,** 1954, pp. 9, illus.
Detailed instructions.

p PERCO, E.
La viticoltura triestina. **(Vine growing in Trieste.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 154-62, illus.

q PEYER, E.
Wie kann in unserem Rebbau Sommerarbeit eingespart werden? II. Die Hochkulturen nach L. Moser und deren Eignung in unseren rebbaulichen Verhältnissen. **(Saving summer labour in the vineyard. II. L. Moser's trellis method in Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 191-6, bibl. 4, illus.
Caution still advised [see *H.A.*, 22: 231].

r POGGI, G.
Panorama della viticoltura friulana. **(Outline of viticulture in Friuli.)**
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 76-82.

s STARK, E. W.
Wood anatomy of the Juglandaceae indigenous to the United States.
Stat. Bull. Purdue Univ. agric. Exp. Stat. **595,** 1953, pp. 42, bibl. 68, illus.
In 6 species of *Juglans* and 16 of *Carya*.

t SYAMAL, N. B., AND PATEL, G. I.
A wild species of grape in India.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 228-30, bibl. 7.
Resembling in certain morphological respects *Vitis latifolia*.

u TUPIKOV, M. A.
Polarity in vine shoots. [Russian.]
Agrobiologija, 1953, No. 4, pp. 149-51, illus.
Apparently only under dark, damp and warm conditions. [See also *H.A.*, 23: 2721 and abstract 2361 above.]

v TURKOVIĆ, Z.
Ampelografski Atlas. **(An ampelographical atlas.)**
Published by Poljoprivredni Nakladni Zavod, Zagreb, undated, from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 95, illus.
A German edition has also appeared.

w ZIMMERMANN, J.
Zur Funktion des Markgewebes im Wasserhaushalt der Rebe. **(On the function of the medullary tissue in the water balance of the vine.)**
Z. Pflanzenz., 1953, No. 32, p. 2, from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 144.
See also abstract 2362.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 2348, 2349, Section on Weeds and weed control, 3291.)

2396. Statens Plantepatologiske Forsøg.
Plantesygdomme i Danmark 1951. (**Plant diseases and pests in Denmark in 1951.**) [English summary 15½ pp.]
Tidsskr. Planteavl, 1954, **57**: 1-67.

Includes pests and diseases of fruit, vegetables and ornamentals, some of them recorded in Denmark for the first time.

2397. United States Department of Agriculture.
Distribution, symptoms and control of some of the more important plant diseases.
Plant Dis. Reptr 1953, *Suppl.* **221**, pp. 106-81.

Very brief notes are given on the major diseases of ornamentals, shade trees, special crops (mint, safflower), *Hevea*, sugar cane, tobacco, vegetables, lawn grasses and fruit crops (apple, apricot, avocado, banana, blackberry, blueberry, cherry, citrus, cranberry, fig, grape, peach, pear, pecan, plum, quince, raspberry, strawberry). The diseases and hosts are mainly those occurring in the United States; banana and rubber are the main exceptions.

2398. Biologische Bundesanstalt. f. Land- u. Forstwirtschaft, Braunschweig.
Anleitung für die Untersuchung von Pflanzenteilen und Pflanzenerzeugnissen bei der pflanzensanitären Abfertigung durch die Amtliche Deutsche Pflanzenbeschau. (**Instructions for the examination of plants, plant materials and plant products by the German plant inspection service.**)
Bundesministerium f. Ernährung, Landwirtschaft u. Forsten, 2nd revised edition, 1954, 8×6 in., pp. 100, illus.

Issued as an aid to German quarantine officers in the identification of plant diseases and pests. There are 5 coloured plates and 80 other illustrations.

Disturbances of nutrition or of unknown origin.

(*See also* 2250, 2272, 2273, 2329, 2386, 2546n, 3292.)

2399. van Niekerk, P. E. le R., Beyers, E., and Pienaar, W. J.
Trace element research by the Western Province Fruit Research Station, Stellenbosch.
Decid. Fruit Gr, 1954, **4**: 40-4, illus.

Trace element deficiencies were rare in the orchards and vineyards of the Western Province 25 years ago but they have increased so greatly, especially of magnesium, manganese, zinc and iron, that they now threaten the fruit growing industry. The increases are due to the character of the soils, which are often poor, and to injudicious manuring. Notes are given on methods of diagnosis (leaf analysis is being developed), on chemical and spectrographical analysis of plant material and soils, and on the control of deficiencies by soil applications and leaf sprays.

2400. Ramsfjell, T.
Mangelsjukdommer hos frukttre og baervekster. (**Deficiency diseases of top and small fruit.**)
Frukt og Baer, 1954, **7**: 15-31, illus.

Symptoms of the following mineral deficiencies are described and illustrated by colour plates: Potassium in apple and gooseberry, iron in apple and cherry, manganese in apple and peach, copper in apple and pear, zinc in apple and pear.

2401. Mulder, D.
Voedingsziekten bij fruitgewassen. (**Nutritional disorders of fruit crops.**) [English summary 1½ p.]
Tuinbouwvoorlichting **1**, revised 1954, pp. 66, bibl. 14, illus., fl. 1.75.

The second edition of this useful booklet has additional coloured plates, all of which are provided with English as well as Dutch explanations. [See *H.A.*, 23: 3959.]

2402. Togliani, F.
Segnalazione di una malattia delle piante di melo, osservata in Emilia e in Romagna, a probabile eziologia nutrizionale. (**Report of a disorder probably of nutritional origin observed in apple trees in Emilia and Romagna.**)
Ann. Sper. agrar., 1954, **8**: 467-74, bibl. 7, illus.

A decline, often ending in death, was under observation in Delicious and Abbondanza apples in the Emilia-Romagna area in 1951 and 1952. Affected trees had a sickly appearance and showed much reduced growth especially in the young parts. Other symptoms were leaf abnormalities and blisters on the bark.—Lab. sper. Pat. veg. Bologna.

2403. Batjer, L. P., and Rogers, B. L.
"Blossom blast" of pears: an incipient boron deficiency.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 119-22, bibl. 4, illus.

Evidence is presented indicating that blossom blast of pears in central Washington is caused by boron deficiency of an incipient or temporary nature. It is assumed that under certain soil and environmental conditions pear trees are incapable of obtaining an adequate supply of boron from either the soil or their reserves to meet the requirements of young developing tissues. This requirement can be effectively supplied by sprays which contain boron. A treatment with 2 lb. of boric acid in 100 gal. applied on 18 April, 1 week before full bloom, largely prevented the disorder which appeared on 70% of the controls by 23 April.

2404. Gärtel, W.
Wie wirkt sich Bormangel bei der Rebe aus? (**Symptoms of boron deficiency in vine.**)
Rhein. Weinz., 1953, **3**: 64, from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 96.

It is estimated that in the Moselle region losses from boron deficiency average 50% of the potential grape crop. The various symptoms exhibited are due to two fundamental causes: (1) injuries to the conducting vessels leading to blockages and (2) the absence of boron in the secretion of the stigma resulting in the inability of the pollen tube to germinate. Soil applications of 1–2 kg. borax per 100 sq. metres are considered preferable to foliage sprays.

2405. Boek, K.
Die Steinigkeit der Birnen kein Bormangel. **(Stony pit of pears is not due to boron deficiency.)**
Mitt. Obstb Versuchsringes Jork, 1954, **9**: 56.

Analysis of diseased fruits of 3 pear varieties showed that stony pit is not due to boron deficiency. Data are tabulated on the HBO_3 content of healthy and affected fruits.

2406. Oland, K.
Jernmangel hos epletre i Hardanger 1951-1953. **(Iron deficiency in apple trees in Hardanger, Norway, 1951-53.)** [English summary 11 lines.]
Forskn. Landbruk., 1954, **5**: 155-60, bibl. 18, illus.

Symptoms of iron deficiency in apple, as frequently observed in the Hardanger area, are briefly described and illustrated by a colour plate. The injection of iron sulphate tablets cured three trees of 10–12 years old in the first season, but five trees over 40 years old failed to respond within the short experimental period. Small-scale foliage applications of an organic iron compound proved promising in laboratory tests.

2407. Blanchet, R.
Observations sur la carence magnésienne du pommier. **(Notes on magnesium deficiency in the apple tree.)**
Ann. agron. Sér. A, 1954, **5**: 119-28, bibl. 2, illus.

A study of magnesium deficiency in young apple trees, regular-bearing Reinette de Landsberg on M. IX, at the École Nationale d'Horticulture at Versailles showed that the organs most clearly exhibiting deficiency both in symptoms and in chemical analysis are the leaves at the base of the current year's shoots and of bourses. Dry or petiolar injection is a rapid test for Mg deficiency. In young trees deficiency retards wood production more than fruiting and its appearance depends largely on the vigour and root development of the stock. The Mg content of dormant shoots of the current year is directly related to tree vigour; their mineral composition varies greatly according to the degree of the deficiency but their total mineral content varies much less owing to the substitution of one mineral for another. Mg absorption requires that of calcium and nitrogen; nitrogen absorption controls phosphate nutrition, but absorption of potassium appears to be independent of that of the other elements.

2408. McClung, A. C.
Magnesium deficiency in North Carolina peach orchards.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 123-30, bibl. 9, illus.

Two abnormalities of peach leaves, one a marginal chlorosis and the other an interveinal necrotic spotting occurring on 5- to 7-year-old trees growing on Lakeland sand, were largely corrected by soil applications of magnesium sulphate. In spite of the differences in the symptoms the responses to Mg provide strong evidence that both were due to deficiency of this element. The Mg content of the mid-shoot leaves varied from 0·13 to 0·19% in untreated trees and from 0·31 to 0·39% in fertilized trees. Of 2 levels of K applied to the Mg treated trees the higher rate increased the incidence of the chlorosis.

2409. Schanderl, H.
Eine vergleichende Studie über die Stickstoffmangel- und Schlechtwetterchlorose der Reben. **(A comparative study of nitrogen deficiency and bad weather chlorosis in vine.)**
Dtsch. Weinb. wiss. Beihefte 7, 1953, pp. 69-73, from abstr. in *PflSch. Ber. Wien*, 1954, **12**: 67.

The so-called bad weather chlorosis of vine, characterized by a lighter leaf colour with a tendency towards yellow, has been attributed to lack of light and heat. Analyses showed that leaves from affected vineyards and light-green leaves from vines known to suffer from nitrogen deficiency had a higher nitrate content than normal leaves. The juice of chlorotic leaves of both types had a higher oxidation and a lower reduction capacity than that of normally green leaves. In the field an increase in leaf nitrate was produced experimentally by limiting the incidence of light, but the application of a reducing agent failed to raise the reduction capacity of the juice, or to cure the malady. The practical conclusion drawn from these results is that the application of nitrates contributes to bad weather chlorosis.

2410. Ciferri, F.
Carenza di potassio della vite curata per via fogliare. **(Potassium deficiency in vines cured by leaf sprays.)**
Not. Mal. Piante, 1954, No. 26, pp. 11-14, bibl. 5.

Leaf spraying with 1% potassium sulphate increased leaf potassium by 35% in Cyclopica vines at Pavia University Botanic Garden and cured potassium deficiency. Potassium absorption was increased by the addition of either urea or a wetting agent or bordeaux mixture.—Ist. Pat. veg., Univ. Milano.

2411. Ljones, B., and Refsdal, K.
Klorskade på jordbaer. **(Chloride injury to strawberries.)**
Frukt og Baer, 1954, **7**: 73-80, bibl. 13, 1 colour plate.

I. In field trials with the strawberry variety Southland K was applied on 7 May, 1953, as potassium chloride, potassium sulphate and potassium-magnesium at three levels corresponding to 8·5, 14·0 and 25·0 kg. K per 1,000 m². By 7 July symptoms of chlorine injury had appeared in all plots receiving the highest and the medium KCl applications and in half the plots receiving the highest K–Mg applications. Leaf analysis showed that the Cl content of the plant did not strictly correspond to the amount of Cl applied. II. In pot trials with the varieties Ydun and Deutsch Evern three chlorides (NaCl, KCl and $CaCl_2$) were applied with the irrigation water at concentrations ranging from 0 to 0·4% Cl. Although the damage caused was severe with all the chlorides tested, especially at the higher concentrations, KCl was, on the whole, more injurious than NaCl or $CaCl_2$. From the analytical data presented it is concluded that symptoms appear when the Cl content of the leaf rises to about 0·5%, the values found in the leaves of plants treated with 0·2 and 0·4% Cl solutions being very much higher. The results confirm the old rule that it is advisable not to manure strawberries with chloride-containing fertilizers. Symptoms of chloride injury are illustrated on a colour plate.

2412. Oganesjan, A. P.
Salt tolerance of some fruit crops. [Russian.]
Bot. Žurnal, 1953, **38**: 744-51, bibl. 4, illus.

Observations and experimental work in Armenia have shown that apricot trees in soil of up to 0·5% mixed salt content grow normally. Salt concentrations up to 2% affected growth and over 2% proved fatal. Apples were found to be more susceptible, 1·2% salt content being the upper limit. The most tolerant species observed were *Ziziphus jujuba*, *Elaeagnus angustifolia* and *Punicum granatum* and the least tolerant *Diospyros kaki*. Almonds, plums, and pears resembled apricots in their salt tolerance and peaches resembled apples. Ecological conditions affect salt tolerance, which is greater in a temperate climate and less under hot, dry conditions.

2413. Imazu, T., and Osawa, T.
The effects of sodium chloride on some vegetables. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **22**: 197-202, bibl. 22.

Strawberry, *Allium fistulosum* and *Brassica chinensis* grown in sand culture were subjected to NaCl concentrations of 2,000 to 10,000 p.p.m. Strawberry was the most sensitive, showing leaf scorch, discoloured roots and poor growth at 3,000 p.p.m. The symptoms in onion and chinese cabbage were dwarfing and dark green curled leaves respectively. In all 3 crops reduction in growth increased progressively with increasing salt, but there was no point at which the effect of increasing concentrations abruptly became pronounced. Excessive chloride appeared to interfere with carbohydrate metabolism. Na and Cl contents were nearly proportional to the amounts of salt in the substrate but more Cl was accumulated than Na. In strawberry there were decreases and in onion slight increases in N, P, K, Ca, Mg, etc. In chinese cabbage P, K, Ca and Mg decreased while N showed a tendency to increase.

2414. Jannone, G.
Agricoltura e industria in Liguria con particolare riguardo a un caso di fitotossicità da ipoazotite. (**Agriculture and industry in Liguria with special reference to a case of nitrogen dioxide injury.**)
Humus, 1954, **10** (1): 17-19, bibl. 1, illus.

Peach, cherry and *Robinia* trees near a factory in Liguria suffered damage from NO_2 (nitrogen dioxide). Peaches were the most severely affected; at 50–60 m. from the factory a number of trees of all ages were killed or partially killed, current-year and one-year-old shoots showed dry depressed spots on the side exposed to the gas, June/July production was almost entirely lost, and complete defoliation occurred. Up to 200 m. from the factory signs of injury were evident and production was low and a few days early. Cherry production was little affected but the foliage was unhealthy and there was some defoliation. Wild *Robinias* were completely defoliated. In all 3 species the new leaves which came out later in the season after defoliation showed many small holes between the veins, a condition similar to leaf spot. Vines, figs, apples, cabbages and french beans showed little or no injury.—Osserv. fitopat., Genoa.

Climatic factors.

(*See also* 2129, 2194, 2230, 2231, 2246, 2247, 2369, 2370, 2387, 2545h, i, 2546a.)

2415. Bömeke, H.
Kronenbrüche als Folge des kalten Winters 1939/40. (**Breakage in tree tops resulting from the cold winter 1939/40.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 54-5, illus.

Following a spring frost in 1938 an apple orchard in the Hamburg area bore an exceptionally heavy crop in 1939. During the past 3 years (1951–53) breakage of limbs in the now 50-year-old trees has been fairly frequent, especially in the varieties Boskoop, Coulon and Gravenstein. An examination of broken branches showed that the pith was discoloured and partly rotten. Young trees, which were not in bearing in 1939, remained practically unaffected. It is suggested that the severe frost of the winter 1939/40 caused damage to the pith of exhausted trees and that this was subsequently aggravated by bacterial invasion.

2416. Neubauer, H. F.
Abnormal development of plant organs as conditioned by "late frosts", and an attempt at an experimental analysis of this phenomenon.
Indones. J. nat. Sci., 1953, **109**: 113-24, bibl. 2, illus.

An analysis of the effects of late spring frosts on *Juglans regia*, *Helianthus annuus* and *Prunus cerasus* showed that they may be stimulating or injurious to the plant tissues, depending on their severity. In experiments in Afghanistan packing the growing tips of *Helianthus annuus* in ice produced similar results to those of natural frost, as did artificial wounding of the growing points with dissecting needles.

2417. Primault, B.
L'influence de l'insolation sur la température du cambium des arbres fruitiers. (**The effect of insolation on the temperature of the cambium of fruit trees.**)
Rev. romande Agric. Vitic., 1954, **10**: 26-8, bibl. 8, illus.

Spring damage to fruit tree trunks, which consists normally of slight longitudinal swellings which soon disappear and are replaced the next year by furrows and which occurs mainly on the south-west side of the trunk, is commonly ascribed to frost. In time the bark becomes scaly and peels off leaving, in serious cases, a wound which heals gradually and may result in die-back of the part of the crown above it. Struck with the fact that such wounds never occur on the north-east side of trees the author investigated their cause with a view to preventing them. Records were kept of the temperature of the cambium of a plum tree in Zurich for a year in 1952/53. Insolation caused the temperature of the cambium to rise considerably higher than that of the surrounding air, the difference being greatest in spring and persisting until after midnight. It was concluded that the injury in question is the result of intense activity of the cambial cells stimulated by high temperatures at a season when the tree is not fully supplied with sap and the lack of water causes the bark to scale off and leave a wound. Wrapping with straw or whitewashing reduced temperature fluctuations by about two-thirds and both gave effective protection.

2418. Fuss, F., and others.
Die Frostnacht vom 19. zum 20. Mai 1952 und ihre Auswirkungen auf gärtnerische Kulturpflanzen in Sachsen. **(The frost on the night of 19-20 May, 1952, and its effects on horticultural plants in Saxony.)**
Arch. Gartenb., 1954, **1**: 9-68, bibl. 31, illus.

I. F. Fuss: *Origin and distribution of spring frosts, with special reference to the night of 20 May, 1952*, pp. 9-22. The discussion of meteorological conditions on this night of frost is supported by climatological data and weather charts. In central Germany ground frost is very likely to occur on calm radiation nights if the air temperature at 2 m. above ground level drops below +3° C.

II. E. Ernst and A. Lauenstein: *Observations on frost damage to vegetables*, pp. 22-30. With the exception of carrot, poppy, caraway and beetroot the frost damaged all early vegetables. The degree of the injury appeared to depend on many factors, such as variety, developmental stage, locality and nutritional status.

III. W. Junges: *Observations on vernalized vegetable crops*, pp. 30-5. Peas, french beans and castor beans were injured according to the developmental stage they had reached at the time of the frost. Vernalization in itself did not afford any frost protection.

IV. B. Borck and H. Müller: *Observations on injuries to fruits and fruit trees*, pp. 35-41. Flowers and young fruits of apples, pears, cherries, strawberries, raspberries, blackberries and walnuts were more severely damaged than those of apricots, peaches, plums, gooseberries and currants. Injuries to leaves and shoots were especially noticeable in nursery trees. The degree of damage appeared to depend on the developmental stage at the time of the frost rather than on species and variety, trees that were late in leafing out owing to grafting or transplanting being more heavily injured.

V. K. Thiele: *Observations on injuries to vine*, pp. 41-4. The degree of the injury depended on such factors as nutritional status and health rather than on variety. The treatment of frost-damaged vines is discussed.

VI. H. F. Kammeyer: *Observations on injuries to ornamental plants and forest trees*, pp. 44-53. At first, the damage to ornamentals seemed severe, but later on the plants made up for the, in many cases complete, loss of leaves.

VII. W. Junges: *Plant physiology. Effect of spring frosts*, pp. 54-9. The symptoms observed in herbaceous and woody plants are discussed. Regeneration of organs killed by frost was aided by hard pruning.

VIII. B. Borck: *The prevention of spring frost injuries*, pp. 59-65. In many cases frost damage was prevented or mitigated by smoke screens, irrigation or plastic cloches.—Inst. f. Gartenbau and Agrarmeteorol. Forschungsstat., Dresden-Pillnitz.

2419. Anjou, K.
Vårfrostskador hos äpple och päron vid Balsgård 1953. **(Spring frost injuries to apples and pears at Balsgård 1953.)** [English summary ½ p.]
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 66-78, bibl. 9, illus.

The reactions are recorded of early and late flowering apple and pear varieties to April and May frosts with minimum temperatures of −4° C. Frost damage symptoms appearing on the fruits in summer are described and illustrated.

2420. Anjou, K.
Vinterskador på äpple-och pärонträd vid Balsgård 1953. **(Winter frost damage to apple and pear trees at Balsgård, 1953.)** [English summary ¾ p.]
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 139-47, bibl. 5, illus.

Field observations on winter injury in 1953 at Balsgård have confirmed that most commercial varieties of apples and pears will be more or less damaged by a normal winter in south Sweden, if the preceding summer and autumn have been unfavourable. Four different kinds of frost damage were noted: 1. Root damage was only observed on a poor sandy soil in pear seedlings and in apple varieties on M. IV and M. IX. 2. Trunk damage was mainly seen in Cox's Orange on M. IV and appeared to be commonest in vigorous trees which had been pruned comparatively early in the pruning season. 3. Bud damage occurred mostly in the apple varieties Belle de Boskoop and Filippa and in the pear varieties Belle Lucrative (Esperens Herre) and Pitmaston. Nearly all the tetraploid types showed severe symptoms, especially those deriving from Belle de Boskoop, while those from Mère de Ménage (Husmoder) were comparatively undamaged. 4. Leaf damage was observed especially in Cox's Pomona, Filippa, Jonathan, Maglemer and Ribston. Trees showing stunted and wrinkled leaves gave very little or no crop in the autumn of 1953. Among apple varieties showing no, or slight, symptoms were Blenheim, Bodil Neergaard, Cox's Orange, Golden Delicious, Laxton's Superb, Ontario, and Pigeon. No correlation between defoliation in the autumn and frost damage could be discovered. [From author's summary.]

2421. Kaleganov, A. A.
Losses caused in prostrate plantings. [Russian.]
Sad i Ogorod, 1954, No. 2, pp. 62-4.

In the southern parts of the Krasnojarsk region prostrate apple trees are most likely to be damaged just before bud break, when high day temperatures are followed by night frost. For control it is recommended that the winter cover should be removed only after the danger of sharp frosts has passed (15–25 May) and that all branches should then be whitewashed and shaded.

2422. Oldén, E. J.
Frysningsförsök med äpplegrundstammar. **(Freezing trials with apple rootstocks.)** [English summary ½ p.]
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 122-31, bibl. 6, illus.

Freezing trials with new clonal rootstocks bred at

Balsgård were carried out in the laboratory during the winters of 1950, 1952 and 1953 with the aim of selecting for frost resistance. Plants from stool beds grown in wooden containers for one or two seasons and roots dug up in the nursery were exposed to temperatures of −15° C., and shoots to −35° and −40° C. A table indicates the points awarded for hardiness of root and aerial parts and for root regeneration. Some of the new stocks showed a high degree of frost resistance, but the roots of M. XI also proved exceptionally hardy.

2423. Rogers, W. S., and others.
Low temperature injury to fruit blossom. IV. Further experiments on water-sprinkling as an anti-frost measure.
J. hort. Sci., 1954, **29**: 126-41, bibl. 16, illus.

Laboratory and field experiments on sprinkling plants with water as an anti-frost measure are described. The more severe the frost the greater the amount of water required to maintain a given temperature. In radiation frosts with a wind speed of 2 m.p.h. or less, a precipitation rate of 2 mm./hr is likely to protect apple blossom from a screen minimum of 26° F. (−3·3° C.); 4 mm./hr from 23·5° F. (−4·8° C.); and 6 mm./hr from 21·5° F. (−5·8° C.). If the wind speed is higher, the protective effect is correspondingly reduced. The start of sprinkling may be delayed until shortly after the temperature of the air has fallen below 32° F. (0° C.). Sprinkling may safely be stopped when the air temperature has returned to 32° F. (0° C.), and if there is no wind and the temperature is rising rapidly, it is probably safe to stop sprinkling when the air temperature has risen to 30° F. (−1·2° C.). The ice formed by sprinkling caused the branches of mature apple trees to bend, but did not break them. The results are discussed with special reference to protecting apple blossom in the spring. The field tests included rapidly rotating small sprinklers, impact sprinklers, oscillating spray lines, a large rotary rainer, and fine mist sprinklers. [Authors' summary.]—East Malling Res. Stat.

2424. Businger, J. A.
Nachtvorstbestrijding door middel van rook. **(Night frost protection by smoke.)**
Fruitteelt, 1954, **44**: 373, illus.

Experiments at Wageningen have shown that in Holland the weather is never calm enough for smoke to be effective, and the droplets formed in the smoke are not large enough to prevent infra-red radiations from the earth's surface. Two methods of smoke production are described.

2425. Schellenberg, A.
Milderung der Frostschäden durch angepasste Kulturmassnahmen im Weinbau. **(The mitigation of frost damage to vines by cultural methods.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 134.

The author records observations made after the bad frost on the night of 10/11 May, 1953: (1) Vines on unworked soils showed distinctly less injury than those on cultivated soils, even at temperatures of −7° C. (2) Where the first thinning out of leafy shoots was carried out before 10 May, frost damage was more severe. This operation should be delayed until the danger of frost has passed. (3) The rows of a vineyard bordering on grass are liable to suffer most, especially when the grass is high. (4) The heat radiated from walls and roads often affords a certain protection on cold nights. (5) Attention is drawn to the importance of erecting straw screens early.

2426. Primault, B.
Die Verwendbarkeit von Strohschirmen als Frostschutz für Reben im Lichte der Maifröste 1953. **(The value of straw covers for the protection of vines as shown by the May frosts of 1953.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 180-5, bibl. 4, illus.

After the severe May frosts in 1953 observations were made in vineyards in the Zürich district on the protective value of straw sheaths placed over the vines. Although these covers cannot be relied upon to prevent frost damage at temperatures below −5° C., plants remained uninjured at lower temperatures if they were sufficiently insulated from the surrounding air. Such insulation is achieved by tying the sheath round the vine at the bottom and ensuring that there are no gaps in the straw cover.

2427. Buchloh, G.
Schädigungen der Obstgehölze durch Hagelschlag und Möglichkeiten der Wundverheilung. **(Wound healing in hail-damaged fruit trees.)**
Dtsch. Baumsch., 1954, **6**: 92-7, illus.

Observations were made on apple, pear, plum and cherry trees which had been damaged by hail in the nursery stage. Injuries to bark, bast and wood and the callusing of the wounds are described and illustrated.

2428. Christ, E. G.
Pruning drought injured plants.
Proc. 22nd annu. Blueberry Open House, N.J. agric. Exp. Stat., 1953, pp. 6-7.

Pruning recommended for blueberry plants injured by drought is aimed at retaining only the best fruiting shoots.

Viruses.

(*See also* 2545k, n, i, l, 3323n.)

2429. (Richter, H.)
Einweihung eines neuen Dienstgebäudes der Biologischen Bundesanstalt in Braunschweig. **(Inauguration of a new building at the Biologische Bundesanstalt, Braunschweig.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 50-1, illus.

An institute for plant virus research has been opened at the Biologische Bundesanstalt f. Land- u. Forstwirtschaft, Braunschweig, with Professor Dr. H. Richter as director.

2430. Hildebrand, E. M.
Fruit virus diseases in New York in retrospect.
Plant Dis. Reptr 1953, *Suppl.* **222,** pp. 185-223, bibl. 84, illus.

An account is given of studies on the nature and identity of the virus diseases of sour and sweet cherry and other fruits carried out in New York State during the decade 1935/44. Yellows and ringspot are the

2 most important cherry diseases. Freedom from disease cannot be achieved until a system of certification is introduced for both stocks and scions: the problems connected with certification are discussed.

2431. Reinmuth, H.
Bandchlorose an Pflaumen. (**Banded chlorosis of plums.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1954, **8**: 48-50, bibl. 7, illus.

In 1952, banded chlorosis appeared for the first time on plum trees at the Institut für Phytopathologie und Pflanzenschutz, Rostock University. At present, the disease is harmless, but it should be studied in view of the danger that may arise from its combination with another virus or a change in pathogenicity. The symptoms are described.

2432. Wolfe, H. R., and Anthon, E. W.
Effect of spray programs in cherry orchards on two leafhopper vectors of the western X-disease virus in Washington.
J. econ. Ent., 1953, **46**: 873-6, bibl. 2.

A spray programme of 4 parathion and 1 TEPP treatments applied for fruit tree leaf roller, *Archips argyrospila* and cherry fruit fly, *Rhagoletis cingulata*, control also materially reduced the population of the leafhopper vector, *Colladonus geminatus*. The last parathion and previous TEPP sprays were, however, followed by a build-up of leafhoppers. In other experiments treatment with the same substances showed varied success against the leafhopper vectors *C. geminatus* and *Scaphytopius acutus*.

2433. van der Meer, F. A.
De incubatie-tijd van de dwergziekte bij verschillende frambozenrassen. (**The incubation period of Rubus stunt in some raspberry varieties.**) [English summary 6 lines.]
Tijdschr. PlZiekt., 1954, **60**: 69-71, bibl. 2.

Many field observations showed that the first symptoms of Rubus stunt in the raspberry variety Radboud appear in summer and autumn of the second year after planting, if the plantation has been started with healthy stock. In grafting experiments in a non-heated glasshouse with the varieties Norfolk Giant and Radboud the first symptoms, however, were observed four months after inoculation by this method. [Author's summary.]—Inst. PlZiektenk. Onderz., Wageningen.

2434. Cadman, C. H.
Studies in *Rubus* virus diseases. VI. Aphid transmission of raspberry leaf mottle virus.
Ann. appl. Biol., 1954, **41**: 207-14, bibl. 8.

Raspberry leaf mottle virus is acquired by *Amphorophora rubi* in feeding periods of ½ to 2 hours. During continuous feeding on healthy plants, infectivity declines rapidly after 2 hours, but persists for at least 5 hours if aphids are transferred frequently to healthy plants. The estimated probability of infection by single aphids is 1 in 20. Infection varied in different strains of *Rubus occidentalis* seedlings.

2435. Chambers, J.
Heat therapy of virus-infected raspberries.
Nature, 1954, **173**: 595-6, bibl. 3.

Raspberry plants infected with certain aphid-transmitted viruses differing from *Rubus* stunt were exposed to air temperatures of 32° C. for periods of one to four weeks. The treated plants were then grafted on healthy plants of the indicator species *Rubus henryi* and found to be free from virus disease. New techniques are also described, but results were not available at the time of writing.—Scot. hort. Res. Inst., Mylnefield, Invergowrie, Dundee.

2436. Frazier, N. W., and Thomas, H. E.
Strawberry a host of western aster yellows virus.
Plant Dis. Reptr, 1953, **37**: 272-5, bibl. 2, illus.

Flower phyllody in strawberries is shown to be a characteristic symptom of infection with western aster yellows virus. Transmission studies are reported.

2437. Freitag, J. H., and Frazier, N. W.
Natural infectivity of leafhopper vectors of Pierce's disease virus of grape in California.
Phytopathology, 1954, **44**: 7-11, bibl. 3.

Tests in different localities showed that 18–19% of green leafhopper (*Draeculacephala minerva*) and of red sharpshooters (*Carneocephala fulgida*) and 11% of blue-green sharpshooters (*Hordnia circellata*) were naturally infective for Pierce's disease. Eight of 12 other leafhoppers tested were also naturally infective.

2438. Stellwaag, F., and Lusis, E.
Zur Technik der Untersuchungen über die Reisigkrankheit der Rebe. (**The diagnosis of court-noué in vine.**)
Dtsch. Weinb., wiss. Beihefte 7, 1953, pp. 90-9, from abstr. in *PflSch. Ber. Wien*, 1954, **12**: 40.

An examination of many series of microtome sections showed that the number of rods in the intercellular space of vine shoots is not an index of the severity of court-noué.

2439. Vuittenez, A.
Observations sur le diagnostic anatomique de la dégénérescence infectieuse de la vigne. (**Notes on anatomical diagnosis of infectious degeneration in the vine.**)
C.R. Acad. Agric. Fr., 1954, **40**: 146-51, bibl. 14.

The presence of "endovascular filaments" in mature tissue permits the early diagnosis of infectious degeneration in the vine. The filaments consist typically of rod-like structures crossing the cells, chiefly those of the vessels, are best seen in the secondary wood at the base of the shoots, and often form radial lines arising at the cambium. They are common in Kober 5 BB and similar hybrid rootstocks but rare in vinifera, in the case of which it is necessary to graft a scion of a variety like Kober that readily forms endovascular filaments onto a stock of the mother plant to be tested. In 1953 this method of diagnosis was successfully used in the selection of healthy families of Pinot Chardonnay, a variety very susceptible to infectious degeneration.

2440. Ciferri, R.
Laciniatura primaverile e degenerazione infettiva della vite. (**Spring laciniation and infectious degeneration of the vine.**)
Atti Accad. ital. Vite, 1952 (issued 1953), **4**: 325-44, bibl. 38.

An account is given of experiments carried on at intervals since 1934, which show that transitory spring leaf laciniation is due to an attenuated form of the virus which causes similar permanent symptoms and that both are caused by infectious degeneration in susceptible American vines.

Bacteria.

(*See also* 2545c, u.)

2441. Goodman, R. N., and Hemphill, D. D.
The effects of indole-3-acetic acid on the plant disease-inhibiting properties of antibiotics.
Science, 1954, **119**: 347-8, bibl. 11.

Jonathan apple trees that had been kept in cold storage were sprayed with an antibiotic spray, containing streptomycin and terramycin with and without the addition of indole-3-acetic acid. Twenty-four hours later the trees were inoculated with *Erwinia amylovora*. The addition of indole-3-acetic acid to the spray increased the protection from 25% to 87%.

2442. (Dunegan, J. C.)
Antibiotics and bacterial diseases.
Agric. Res., 1954, **2** (9): 10, illus.

Fire blight (*Erwinia amylovora*) on Bartlett pears and Japanese plums can be controlled to some extent by streptomycin sprays, without the fruit russeting that may follow the use of copper sulphate. Preliminary results on the control of bacterial spot (*Xanthomonas pruni*) of plums by tree injections of terramycin show promise.

2443. Ark, P. A.
Streptomycin for plant diseases.
Calif. Agric., 1954, **8** (3): 7-8, illus.

Streptomycin, as a bactericide, was combined with some standard fungicides and insecticides, but there was no inhibition of its activity, except in the presence of fermate against walnut blight bacteria. Cucumber seed contaminated with angular leaf spot (*Pseudomonas lachrymans*) and tomato seed with tomato canker (*Corynebacterium michiganense*), were steeped in streptomycin solution, and subsequent plants revealed no injury. Fire blight (*Erwinia amylovora*) is controlled by streptomycin, when the open blossoms are sprayed. Streptomycin applied in a pre-bloom and a post-bloom spray controlled walnut blight (*Xanthomonas juglandis*) satisfactorily.

2444. Murneek, A. E.
Antibiotics used in controlling fireblight outbreaks.
Bett. Fruit, 1954, **48** (9): 6-7, 30, illus.

In Missouri antibiotics sprayed on apples when the flowers were in the so-called balloon stage of development or when 30–50% were in bloom gave complete control of fire blight, *Erwinia amylovora*. The most effective antibiotics in 1953 were streptomycin and terramycin applied singly or combined at 100–150 p.p.m. concentration with cellosolve or carbowax at 1% as penetrants.

2445. Ark, P. A.
Use of streptomycin dust to control fire blight.
Plant Dis. Reptr, 1953, **37**: 404-6, bibl. 7.

Bentonite dust containing 240 p.p.m. of streptomycin base effected good control of pear blight [*Erwinia amylovora*] when applied four times during March and April. A copper-dust-treated plot developed light to severe fruit russeting, whereas the streptomycin-treated trees produced russet-free fruit. [Author's summary.]

2446. Winter, H. F., and Young, H. C.
Control of fire blight of apples in Ohio in 1953.
Plant Dis. Reptr, 1953, **37**: 463-4.

Three spray applications during May of streptomycin and terramycin, both at 60 and 120 p.p.m., gave excellent control of fire blight on Jonathan trees inoculated with *Erwinia amylovora*. In the same test dithane Z-78 did not give satisfactory commercial control and the control trees were very severely blighted.

2447. Dye, D. W.
Blast of stone fruit in New Zealand.
N.Z. J. Sci. Tech., Sect. A, 1954, **35**: 451-61, bibl. 16, illus.

This disease is serious in New Zealand; a description of the symptoms is given. The morphology and cultural and physiological reactions of the causal organism agree with those of *Pseudomonas syringae*.

Fungi.

(*See also* 2232, 2233, 2545c, e, f, p, s, u, 2546b.)

2448. Wagener, W. W., and Davidson, R. W.
Heart rots in living trees.
Bot. Rev., 1954, **20**: 61-134, bibl. 345.

The authors of this article discuss heart rots in living trees under the following headings: the causative fungi, dissemination, infection, progress of fungi and decay, conditions affecting progress of decay in individual trees and stands, physiological effects and losses. The avoidance of heart rots in orchard, shade and ornamental trees rests on 3 basic principles of action, namely prevention of wounding, prompt treatment of wounds, and stimulation of growth to aid rapid healing.

2449. Kirkham, D. S.
Significance of the ratio between the water-soluble aromatic and nitrogen constituents of apple and pear in the host-parasite relationships of *Venturia* species.
Nature, 1954, **173**: 690-1, bibl. 8.

Cultural studies have shown that the aromatic fraction of the water-soluble constituents of apple and pear leaf extracts and its separate main components may be strongly inhibitory to *Venturia inaequalis* and *V. pirina* respectively, depending on the complexity and amount of the nitrogen source. A high level of amino nitrogen, for example, may result in complete degradation of the aromatic compounds, while an inorganic, or low-level amino nitrogen supply favours their inhibitory activity. By injection of inoculated apple and pear shoots with the aromatic fraction of leaf extracts and urea, separately and in combination, evidence has been obtained of a similar mechanism operating *in vivo*. The results of many experiments, details of which are here briefly summarized, suggest that the reaction of a *Venturia* clone to the aromatic/nitrogen ratio of the host may be a critical factor controlling the level of pathogenicity.—East Malling Res. Stat.

2450. Mitchell, A. E.
Concentrate spraying comes of age.
Marshall, J.
Concentrates cut costs.
Hilborn, M. T.
Fighting apple scab with concentrate sprays.
Amer. Fruit Gr, 1954, **74** (2): 16-17, 46; (2): 18, 46; and (2): 19, 58-9 respectively, illus.

In the first 2 articles the advantages of concentrate spraying and equipment used in the Midwest of the United States and in Canada are discussed. The third paper describes briefly apple scab control in New England with different concentrations of mild sulphur sprays and with sulphur dust, all applied during rainy periods and giving very satisfactory results. The performances of the various spray and dust machines used are described.

2451. Keijer, E. J., and Dijksterhuis, H. P.
De invloed van schurftbestrijdingsmiddelen op de boom. Proeven en waarnemingen te Zeerijp(Gr.). **(The effect of scab control sprays on the tree. Trials and observations at Zeerijp.)**
Fruitteelt, 1954, **44**: 197-9, 222-3, 225.

Observations are made on the effect of such factors as fungicide, concentration, weather conditions, time of spraying, and change of fungicide or concentration on fruit damage, ripening, colour and keeping quality.

2452. Gaudineau, M., and others.
Tavelure du pommier. **(Apple scab.)**
Arboric. fruit., 1954, No. 2, pp. 3-8, bibl. 6, illus.

Experiments were carried out for 3 years in the south-east of France, on the efficiency and toxicity of different fungicides for the control of apple scab. Four sprays were applied, 1 pre-blossom and 3 post-blossom, to Calville, Belle de Boskoop and Canada apple trees growing in different areas. Although there was variation resulting from climate and position, the best control with least damage to the fruits was given by 1% bordeaux mixture, 0·2% dichloronaphthoquinone, and 0·3% captan, whereas 0·3% ferbam, 1% wettable sulphur with 80% S, ziram and zineb were not satisfactory.

2453. Solaroli, V., and Bongiovanni, G. C.
Prove indicative riguardanti la ticchiolatura del melo. **(Apple scab control trials.)** [English summary 4 lines.]
Riv. Fruttic., 1954, **16**: 41-9.

In experiments at the Bologna Plant Pathology observatory in 1949/53 on the control of apple scab (*Venturia inaequalis*) with various fungicides the best results were given by 1:1 bordeaux mixture at 2–3% applied at the pink bud stage.

2454. Belloni, V. G.
Prove di lotta contro la ticchiolatura delle pomacee. **(Experiments in the control of scab in pome fruits.)**
Not. Mal. Piante, 1954, No. 26, pp. 3-5.

A non-copper (dimethyldithiocarbamate) and a copper fungicide (sulphur plus 25% and 33% copper oxychloride) were compared for the control of scab on Golden Delicious apple and Decana d'Inverno and Passe Crassane pears. The non-copper and the 25% copper fungicides gave good control; the former had a shorter residual effect and stimulated growth. The 33% copper gave some control.—Ist. Pat. veg., Univ. Milan.

2455. Hutton, K. E.
Control of black spot of apples and pears.
Agric. Gaz. N.S.W., 1954, **65**: 161-2, illus.

Experiments in New South Wales on the control of black spot (*Venturia inaequalis*) on apples show that thiram is an effective alternative to lime-sulphur.

2456. Baumeister, G.
Doppelte Sicherung bei der Fusikladium- und Mehltaubekämpfung. **(Dual safeguards in the control of scab and mildew.)**
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 85-90, illus.

The curative treatment of apple scab with mercurial fungicides after infection has taken place is discussed as an alternative to the customary preventive treatment. The latter is recommended for reasons of safety with curative sprays to be applied in addition when necessary. Mildew control has still to rely on wettable sulphur. Some experimental data are presented in support of the recommendations made.

2457. Lewis, F. H., and Dickert, H. W.
Are high priced pesticides for apples worth their cost?
St. hort. Ass. Pa News, 1954, **33** (1): 49-59.

In experiments in Pennsylvania in 1952 and 1953 the use of Crag 341 for scab control on Stayman apples gave the highest yields and the highest profits per tree, when compared with ferbam, crag-mercury and captan.

2458. Varney, E. H.
Protective fungicides for the control of mummy berry on blueberry and notes on botrytis blight.
Proc. 22nd annu. Blueberry Open House, N.J. agric. Exp. Stat., 1953, pp. 17-19.

The life-history of the mummy berry fungus, *Monilinia vaccinii corymbosi*, is described. Control measures are removal of the mummies, and pre-infection sprays: ferbam gave the best spray control. Blossom blight of blueberry, caused by *Botrytis*, has been reduced by dusting with 10% ferbam or ziram.

2459. Pelletier, E. N., and Hilborn, M. T.
Twig and blossom blight of blueberries.
Me Fm Res., 1953, **1** (2): 14-16, illus.

In studies of blueberry twig and blossom blight, caused by *Botrytis cinerea*, it was found that the overwintering mycelium could produce spores within 24 hours under favourable conditions, and that plants were most susceptible during flowering. Good control in the field was obtained with ziram, ferbam and thiram dusts at 15 lb. per acre. Dusting should be done if 2 or more successive wet days occur during flowering. [See also *H.A.*, 24: 302.]

2460. Gjaerum, H. B.
Kirsebaerheksekost og sortsresistens. **(Witches' broom of cherry and varietal resistance.)**
Frukt og Baer, 1954, **7**: 69-71, bibl. 8, illus.

Of the 1,232 cherry trees of 38 varieties examined in Norway 34·8% showed symptoms of witches' broom (*Taphrina cerasi*). Some of the varieties were hardly affected, while in others the percentage of trees with symptoms was very high. The disease is of little economic importance.

2461. Savage, E. F., and others.
Clitocybe root rot—a disease of economic importance in Georgia peach orchards.
Plant Dis. Reptr, 1953, **37**: 269-70, bibl. 5.

The organism causing a root rot of peaches has been identified as *Clitocybe tabescens*. A survey has shown that the disease is widespread in Georgia and partly explains why peaches cannot be successfully planted on old peach soils.

2462. Horn, N. L., and Hawthorne, P. L.
A new fruit rot of peaches.
Phytopathology, 1954, **44**: 134-6, bibl. 1, illus.

An undescribed fungus was found to be parasitic on peaches in Louisiana, and the name *Diplodina persicae* n.sp. was assigned to it. All varieties of peach tested were found to be susceptible when inoculated under artificial conditions. Southland and Burbank Early Elberta were the most, and Sunhigh the least susceptible. Captan, ferbam, and Craig Experimental Fungicide 5400 were effective in preventing fruit rot in laboratory tests. [From authors' summary. See also *H.A.*, 23: 1678.]

2463. Guba, E. F.
Fusicoccum leaf spot and canker of peach, and control.
From abstr. in *Phytopathology*, 1954, **44**: 111.

The fungus, *Fusicoccum amygdalis*, causes irregular dead areas in leaves, and cankers at the nodes of the shoots. Control is obtained by thiocarbamates, thiram, phygon, captan and lime-sulphur.

2464. Brook, P. J.
Experiments in control of peach brown-rot (*Sclerotinia fructicola* (Wint.) Rehm.).
N.Z. J. Sci. Tech., Sect. A, 1954, **35**: 437-50, bibl. 2.

Blossom-blight was reduced from 15% to 2·1–3·5% with applications of Phygon XL or Thirospray at 1 lb. in 100 gal. every 3 or 4 days during flowering. Spraying programmes which continued until a few days of picking reduced fruit infection both at harvest and in storage. Flit-406 at 1 lb./100 gal. gave best control of fruit rot. [Author's summary.]

2465. KenKnight, G., and Jones, J. F.
Reduction in incidence of peach scab as affected by whitewashing trees.
Plant Dis. Reptr, 1953, **37**: 509.

In an experimental plot of Elberta peach trees, on which research on phony peach virus disease was being conducted, the incidence of scab (*Cladosporium carpophilum*) was markedly less on fruits from whitewashed than on those from unwhitewashed trees.—U.S. Dep. Agric., Fort Valley, Ga.

2466. Ashour, W. E., and Allam, M. E.
Shot-hole disease of stone fruits caused by *Clasterosporium carpophilum*.
Nature, 1954, **173**: 456, bibl. 3.

In tissue culture *Clasterosporium carpophilum* mycelium was shown to be viable in peach leaf lesions from March to September. In a study of disease spread in the field it was found that the symptoms appear in March after leaf growth, become gradually more accentuated until May, decline until September and become more pronounced again towards the end of the season. Spraying with bordeaux or lime-sulphur at flowering and fruit set failed to control the disease.—Fac. Agric. Shebin El Kom, Egypt.

2467. Josifović, M.
Le rôle du stade écidien dans l'évolution de *Tranzschelia pruni-spinosae* (Pers.) Diet. **(The role of the aecidial stage in the evolution of *Tranzschelia pruni-spinosae*.)**
From abstr. in *Bull. sci. Cons. Acad. Yugosl.*, 1953, **1**: 57.

The author found that the aecidium spores of *Tranzschelia pruni-spinosae*, which develop on *Anemone ranunculoides*, have a very low germination capacity. It appears that plum rust is spread by uredo spores.—Fac. Agric. Zemum.

2468. Payette, A.
Gangrènes du fraisier. **(Strawberry cankers.)**
Canad. J. agric. Sci., 1954, **34**: 187-97, bibl. 18, illus.

Cankerous lesions on strawberries are found on all plant parts; they are especially severe on plants growing under unfavourable conditions. Isolations made from these lesions during the growing season revealed the presence of bacteria, nematodes and fungus species. Among the fungi were *Botrytis cinerea* and *Rhizoctonia solani*, which were able to attack and destroy every part of the strawberry plant very rapidly.

2469. Scott, D. H., and others.
Resistance of strawberry varieties and selections to races of the red stele fungus.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 306-10, bibl. 7.

Commercial varieties and new selections of strawberry were tested for resistance to 3 races of red stele fungus, *Phytophthora fragariae*, present in 3 separate Maryland fields [see also *H.A.*, 23: 1682]. No commercial varieties were found to be resistant to all 3 races but 2 of the new Maryland selections proved to be so. Certain Oregon selections tested in 2 of the infested soils were also found to be resistant. Partial resistance of some varieties and the value of this for breeding are briefly discussed, and it is suggested that there is resistance to red stele in each of the 3 octoploid species from which cultivated strawberries are derived.

2470. Bolton, A. T.
***Gnomonia fructicola* on strawberries.**
Canad. J. Bot., 1954, **32**: 172-81, bibl. 7, illus.

Under certain environmental conditions, this fungus was occasionally found to cause plant losses as high as 25% among strawberries growing in Ontario and Quebec. The results obtained from nutritional experiments indicate that high concentrations of dextrose suppress, whereas those of starch, cellulose and pectin favour, the growth and reproduction of the fungus.

J.S.

2471. Amphoux, M., and Bernon, G.
La lutte contre le mildiou. **(Control of vine downy mildew.)**
Progr. agric. vitic., 1954, **141**: 214-19, 227-34, 259-62.

The subject is dealt with under 6 headings, namely date of treatment, warnings, organization of control, prophylaxis, and collective and individual control. It is considered that effective control can usually be attained by due regard to prophylaxis, early detection of infection, and treatment.

2472. Carli, A.
Nuovi orientamenti nel campo degli anti-peronosporici. **(New methods of controlling vine downy mildew.)**
Riv. Vitic. Enol., 1954, **7**: 87-95, bibl. 11.

The author reviews recent literature on the control of vine downy mildew with some of the newer fungicides, namely, the thiocarbamates, dichloronaphthoquinone and trichloromethylthiotetrahydrophthalimide and describes successful experiments with dithane Z.78 at Conegliano. He concludes that although bordeaux mixture is still the foremost fungicide for use against vine downy mildew, the day will soon come when effective control can be achieved without recourse to copper.

2473. Picco, D.
Esperienze circa l'impiego di preparati acuprici nella lotta contro la peronospora della vite. **(Tests of non-copper fungicides for the control of vine downy mildew.)**
Not. Mal. Piante, 1954, No. 24/25, pp. 65-73.

In trials in 1953 n-trichloromethylthiotetrahydrophthalimide gave the best results and was followed in descending order of efficacy by zineb plus copper, zineb, and 1% bordeaux mixture. An aluminium sulphate product proved unsatisfactory.—Lab. critt. Osserv. Mal. Piante, Pavia.

2474. Graniti, A.
Prove di lotta contro la peronospora della vite in Sardegna nell'anno 1952. **(Vine downy mildew control tests in Sardinia in 1952.)**
Not. Mal. Piante, 1954, No. 24/25, pp. 75-82, bibl. 4.

1% bordeaux mixture was distinctly superior to the other copper fungicides used and these in their turn were superior to the non-copper products (zineb and n-trichloromethylthiotetrahydrophthalimide).

2475. Anon.
Ziektenbestrijding met het regenkanon. **(Disease control with the rain gun.)**
Tech. Bau. Gärt., 25 Dec., 1953, from abstr. in *Fruitteelt*, 1954, **44**: 470-1.

In the Moselle district of Germany a rain gun has been used for spraying vines against mildews (*Plasmopara viticola* and *Uncinula necator*). Every 15 or 20 seconds a spout of fungicidal spray is ejected and travels as a fine mist through the plants. Good control of mildew was obtained, using less labour than by normal methods.

2476. Manzoni, L., and Carli, A.
Gli zolfi bagnabili nella lotta contro l'oidio. **(Wettable sulphurs for the control of vine powdery mildew.)**
Riv. Vitic. Enol., 1954, **7**: 35-42, bibl. 10.

The authors briefly review recent literature on the subject and describe experiments made by them at Conegliano with partially micronized wettable sulphurs dispersed in copper fungicides. They recommend the use of a good wettable sulphur since its efficacy is equal to, and at certain times greater than, that of volatile sulphur and it does not cause any greater leaf burn.

2477. Sick, E., and Huglin, P.
Sur une pourriture pedonculaire de la vigne produite par "*Botrytis cinerea*". **(On a vine peduncular rot caused by *Botrytis cinerea*.)**
Progr. agric. vitic., 1954, **141**: 114-21, bibl. 6, illus.

Notes are given on a vine peduncular rot (*Botrytis cinerea*) at present fairly common in Northern France, especially in Alsace where the 2 principal varieties, Riesling and Gewürz-Traminer, are the most affected. A 15% yield loss is common. In indirect control tests DDT and phosphoric esters reduced the percentage of bunches attacked by caterpillar to 32 and 7 respectively compared with 75 in the control, and the percentage of bunches attacked by peduncular rot to 68 and 47 compared with 89. In direct control tests copper fungicides were not satisfactory but 1% n-trichloromethylthiotetrahydrophthalimide reduced the percentage of bunches infected to 24 compared with 56 in the control. Dual control of caterpillar and peduncular rot with a mixed spray is envisaged.

2478. Sick, E., and Huglin, P.
Schädlingsbekämpfungsversuche im Weinbau. **(Experiments on the control of pests and diseases of vine.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. A, 1954, **4**: 51-8, bibl. 8.

A brief account is given of trials at Colmar, in Alsace, on the control of downy and powdery mildew, *Botrytis cinerea*, vine moth (*Clysia ambiguella*), grape berry moth (*Polychrosis* spp.) and mites.—Inst. nat. Rech. Agron. Colmar, France.

2479. Turian, G.
Récents progrès de la lutte contre le coître de la vigne. **(Recent progress in the control of vine white rot.)**
Rev. romande Agric. Vitic., 1954, **10**: 12-14.

Prevention of contamination of grapes. Preliminary investigations are discussed. *Prevention of infection in hail-damaged grapes.* In experiments at Pully in 1953 treatments were applied 6 hours after grapes had been artificially wounded and infected. The practical efficacy of the treatment (calculated in relation to the control after 4 weeks) was 46% with 0·5% phthalimide spray, 43% with phthalimide dust, 28% with 0·5% quinoline spray and 5·0% with quinoline dust.

2480. Nisikado, Y., and Watanabe, K.
The large leaf-spot of chestnut.
Ber. Ōhara Inst. landw. Forsch., 1953, **10**: 9-16, bibl. 15, illus.

This foliage disease of chestnut, which is briefly described, produces symptoms in September and develops fully in October and November. Damage is usually light, unless seedlings are affected. The biology of the causal fungus, *Monochaetia desmazierii*, is discussed.

2481. Cole, J. R.
Diseases causing partial or total losses to pecan trees or nuts in the southeastern States where no control measures are employed.
Plant Dis. Reptr, 1953, **37**: 510.

Scab (*Cladosporium effusum*), the most serious pecan disease in Georgia, and the associated saprophytic pink rot (*Cephalothecium roseum*) are controlled by 4 or more sprays of low-lime bordeaux mixture (6-2-100), or Zerlate or Dithane Z-78, each at 2 lb. per 100 gal. with 1 quart of summer oil emulsion added. Notes are also given on the control of the following minor diseases: crown gall (*Agrobacterium tumefaciens*) attacking the crown and lateral roots; 4 foliage diseases, namely downy spot (*Mycosphaerella caryigena*), leaf blotch (*M. dendroides*), powdery mildew (*Mycosphaera alni*), and brown leaf spot (*Cercospora fusca*); and 2 nutritional diseases, namely rosette (zinc deficiency) and leaf scorch (cause and cure unknown).

2482. Pupillo, M.
La "nebbia" del noce. **(Walnut blotch.)**
Inf. fitopat., 1952, **2**: 36-7, illus.

Brief notes are given on walnut blotch (*Marssonina juglandis*). Control is by destroying diseased leaves in winter and by spraying during the growing season with 1% bordeaux mixture.

Nematodes.

(*See also* 2343, 2545r.)

2483. Boubals, D.
Les nématodes parasites de la vigne. Essais de lutte effectués en 1952-1953. **(The nematode parasites of the vine. Control experiments made in 1952/53.)**
Progr. agric. vitic., 1954, **141**: 173-82, 204-8, bibl. 3, illus.

In metropolitan France serious attacks on vines by *Heterodera marioni* are almost entirely limited to sandy soils on the Mediterranean coast and certain inland areas where *Vitis vinifera* is grown on its own roots. The scale of attack and injury depend on the degree of soil infestation at planting and on the resistance of the vines. Field control experiments showed that D-D is unsatisfactory on account of its phytotoxicity, relative inefficiency and high cost at the heavy dosages necessary. Infested vineyards can, however, be reconstituted successfully with the following resistant hybrid rootstocks: SO4, 5BB, 8B, 4010 Castel, 99R, 1616C and 44-53M.—Éc. nat. Agric., Montpellier.

2484. Sato, K., and Shichijo, T.
Growth of young fig trees in old fig orchard soils. [Japanese, with English summary 12 lines.]
J. hort. Ass. Japan, 1953, **22**: 163-6, bibl. 5, illus.

Experiments suggested that poor growth of fig trees replanted in fig orchard soil was largely due to nematode injury.

Mites.

(*See also* 2545m, 2546e, j, k, 3287.)

2485. Miller, L. W.
The control of mites in Tasmanian apple orchards.
Tasm. J. Agric., 1953, **24**: 347-57, bibl. 4, illus.

An investigation on the control of the European red mite, *Metatetranychus ulmi*, has been proceeding in Tasmania for five years. Parathion, systox and pestox 3H gave effective control. Pale or "superior" oil used at green tip stage gave some control. PCPBS was promising in 1952/53.

2486. Newcomer, E. J., and Dean, F. P.
Control of orchard mites resistant to parathion.
J. econ. Ent., 1953, **46**: 894-6, bibl. 1.

In the Pacific Northwest resistance to parathion has developed in *Metatetranychus ulmi*, *Tetranychus pacificus* and *T. mcdanieli*. Good control of these resistant mites has been obtained in apple orchards by combining parathion with DMC, or by using malathon, EPN, systox, aramite, R-242, or *p*-chlorophenyl *p*-chlorobenzene sulphonate.

2487. European Plant Protection Organisation (EPPO).
Red spiders in Western Europe.
FAO Plant Prot. Bull., 1954, **2**: 71-4.

A description is given of the four most common red spider species, *Metatetranychus ulmi*, *Tetranychus urticae*, *Eotetranychus telarius* and *Bryobia praetiosa*, their incidence, possible causes of increased incidence, and control measures. Less important species are also mentioned.

2488. Roesler, R.
Rote Spinne und Witterung. **(Red spider and weather.)**
Z. ang. Ent., 1953, **35**: 197-200, from abstr. in *Z. PflKrankh.*, 1954, **61**: 91.

The increase in *Paratetranychus pilosus* infestation is partly explained by the improved microclimate created by better pruning methods, especially in the spindle bush orchard. The heat wave in July 1952 was harmful to *P. pilosus* in the Rhine valley but stimulated *Tetranychus* spp. Climatic conditions in recent years have in general been favourable to red spiders.

2489. Bagnall, B. H., and Hale, E.
Experiments with red spider ovicides.
Grower, 1954, **41**: 469-71.

In trials on apples equally good control of red spider mite throughout the season was obtained from applications at pink bud and petal fall or at pink bud alone of PCPBS (p-chlorophenyl-benzene sulphonate) and of CPCBS (p-chlorophenyl-p-chlorobenzene sulphonate), which is the active ingredient of the American ovicides, K6451, Ovoclor and Ovotran. Two summer applications were also effective. CPCBS had the added advantage of showing no phytotoxicity to varieties such as Worcester which are liable to injury when sprayed with PCPBS.—Murphy Chem. Co., Wheathampstead.

2490. Huffaker, C. B., and Kennett, C. E.
Developments toward biological control of cyclamen mite on strawberries in California.
J. econ. Ent., 1953, **46**: 802-12, bibl. 11, illus.

Field population studies conclusively showed that the predators, *Typhlodromus reticulatus* and/or *T. cucumeris*, exert very effective control of the cyclamen mite, *Tarsonemus pallidus*, in third- and fourth-year strawberries when their activities are not inhibited by detrimental treatments used for control of other pests. Control in second-year strawberries was somewhat erratic owing, probably, to the lag in appearance of predators and to the more intensive treatment practices applied to the second-year crop. [See also *H.A.*, 23: 2857.]

2491. Fjelddalen, J.
Gallmygg og gallmidd på frukt og baer. **(Midges and spider mites of top and small fruit.)**
Frukt og Baer, 1954, **7**: 37-48, bibl. 16, illus.

The author gives a survey of the gall midges and spider mites which in recent years have had a certain economic importance as pests of top and small fruit in Norway: *Dasyneura tetensi* on black currant, *D. pyri* on pear, *Eriophyes gracilis* on raspberry and *E. similis* and *Phyllocoptes fockeui* on plum. Their biology and control is being studied by the Norwegian plant protection service.

Insects.

(*See also* 2545b, d, j, l, o, q, w, x, 2546d, f, g, h, j, 3272, 3287.)

2492. Solaroli, V., and Bongiovanni, G. C.
Applicazioni sperimentali di insetticidi sistemici. **(Experimental applications of systemic insecticides.)**
Ital. agric., 1954, **91**: 136-43, bibl. 1, illus.

Foliage sprays and soil injections of pestox 66 and systox were applied for the control of green aphid (*Aphis pomi*) and red spider (*Metatetranychus ulmi*) on 2 apple varieties. The residual effects of foliage sprays applied in early June and early July lasted 3-4 weeks and 2 weeks respectively. Soil injections of 50 l. per 20-year-old tree applied on 21 July gave immunity for 40 days but further experiments are required because outside factors affected the results. It was concluded that at least 2 foliage sprays of systemic insecticide are necessary for the control of these 2 pests, one against red spider at the time of blossoming, and a later one against green aphid, which does not become serious until mid-June.

2493. Michelbacher, A. E., and Davis, C. S.
Aphid resistant to parathion.
Calif. Agric., 1954, **8** (5): 8.

A strain of walnut aphid (*Cromaphis juglandicola*) in the San Jose area, California, was found to have developed definite resistance to parathion.

2494. Michelbacher, A. E., and Bacon, O. G.
Systox on walnuts in Northern California.
J. econ. Ent., 1953, **46**: 891-3, illus.

Single treatments of systox at 0·62, 1·25 and 2·5 lb. per acre applied to Payne walnuts on 10 May gave excellent control of walnut aphid, *Chromaphis juglandicola*, for the entire season. Migrating adults were able to establish some colonies on new foliage in early summer and on old foliage towards the end of the season. Systox at the highest dosage caused noticeable leaf injury on the north side of the trees, but this did not seem to reduce the quality of nuts. The treatments also showed evidence of controlling spider mites.

2495. Böhm, H.
Auftreten von *Quadraspidiotus schneideri* n. sp. (Homopt. Diaspidoid.) in Österreich. **(The incidence of *Quadraspidiotus schneideri* n. sp. in Austria.)** [English summary 8 lines.]
PflSch. Ber. Wien, 1954, **12**: 55-7, bibl. 6.

In a study of the incidence of *Quadraspidiotus schneideri* [see *H.A.*, 24: 348] in Austria, apple and pear were found to be the main hosts. Parasites and predacious insects are briefly discussed.

2496. Plate, H.-P.
Der Apfelblütenstecher und die Möglichkeiten seiner Bekämpfung. **(The apple blossom weevil and methods of control.)**
Schädlingsbekämpf., 1953, **54**: 101-4, from abstr. in *Z. PflKrankh.*, 1954, **61**: 86.

Best results were obtained when DDT or BHC was given in addition to the winter wash, DNC. A late application of the winter wash by itself gave insufficient protection.

2497. Hogan, T. W.
Control of the harlequin bug (*Dindymus versicolor* H. Sck.).
J. Dep. Agric. Vict., 1954, **52**: 191-2, illus.

The harlequin bug is indigenous to Australia, and is found on most vegetable crops, flowers, fruit trees and weeds. A spray of 0·03% lindane gave complete control in the field.

2498. Stitt, L. L., and Allmendinger, D. F.
Spittlebug and omnivorous leaf tier in strawberries.
J. econ. Ent., 1953, **46**: 876-8, bibl. 3.

In trials with dusts in south-western Washington, chlordane and toxaphene gave the best control of meadow spittlebug, *Philaenus leucophthalmus*, and DDT, sulphur and TDE of omnivorous leaf tier, *Cnephasia longana*. Chemical analyses of strawberries treated with 24 lb. of 5% chlordane per acre showed residues of 0·019 p.p.m. in the Northwest variety and 0·015 p.p.m. in the Marshall variety.

2499. Dahlmeyer, W. H. M.
Result obtained with aldrin and dieldrin against the Mediterranean fruit fly (*Ceratitis capitata* Wied.) in peach orchards in France.
Paper presented to 3rd int. Congr. Pharmacy, Paris, 15-20 Sept., 1952, from abstr. in *Z. PflKrankh.*, 1954, **61**: 94-5.

Aldrin and dieldrin, applied to the trees and the soil, proved promising for the control of Mediterranean fruit fly on peach. Treatment 3 weeks before harvest was more effective than at earlier dates, but the residue on the fruits after picking was not examined. The addition of dieldrin to the irrigation water is discussed. The experiments were carried out in a peach orchard in southern France in 1951.

2500. Gast, A., and Müller, G.
Beobachtungen über das Auftreten der Mittelmeerfruchtfliege (*Ceratitis capitata* Wied.) in Basel. **(Observations on the incidence of the Mediterranean fruit fly in Basle.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 202-6, bibl. 4, illus.

In the Basle area *Ceratitis capitata* has recently become a serious pest of peach and apricot. Sanitary measures and treatment with DDT are recommended.

2501. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med bekaempelse af paeregalmiden ved hjaelp af metylbromid. **(The control of pear midge by methyl bromide.)**
Tidsskr. Planteavl, 1954, **57**: 360-2.

Fumigation of pear trees with 16⅔ g. methyl bromide per cu.m. at a temperature of 21° and 24° C. for 6 hours gave complete control of midge. If the dosage is doubled, the time of treatment can be reduced to 4 hours. No damage to the plants occurred as a result of fumigation applied at any time during the dormant period. The disadvantage of the method is that it is applicable only to nursery trees.

2502. Veerman, W.
De galmug van het zwarte bessenblad (*Dasyneura tetensi* Rubsaamen). **(The black currant gall midge.)**
Fruitteelt, 1954, **44**: 220.

In recent years the black currant gall midge has become a serious pest in Holland. As it mainly attacks young vigorous growth, it has been recommended that bushes should not be pruned too hard. With most varieties, however, this would reduce the cropping capacity. The author draws attention to the variety Silvergieter's Black, widely grown in Germany, which makes only moderately vigorous growth, crops well on old wood, and requires only light pruning. It is less severely attacked by the gall midge than most varieties, and more extensive planting of this variety is advocated. Parathion applied weekly or systox applied fortnightly gave good control of the pest, but these cannot be used during the fruiting period.

2503. Jensen, F., Stafford, E. M., and Break, R. A.
The grape mealybug.
Calif. Agric., 1954, **8** (3): 11, illus.

Emulsifiable parathion, 4 lb. per gal. diluted to 1% and applied as a dormant spray controlled the mealy bug so effectively that less than 1% of the fruit was infested at harvest.

2504. Bauckmann, M.
Beiträge zur Bestimmung des Apfelwicklerfluges. (Vorläufige Mitteilung.) **(Contributions to the determination of the date of codling moth emergence. Preliminary communication.)**
Kühn Arch., 1953, **67**: 287-90, bibl. 1.

Experiments with a light trap were carried out in a spindle bush apple orchard to determine whether the emergence of codling moths from the box described by Friedrich [*H.A.*, 23: 2896] coincided with moth emergence in the field. Initial trials with a 300-watt incandescent bulb failed, but large numbers of moths were caught when an ultra-violet ray lamp was installed. The observations proved that moth emergence can be timed accurately by means of Friedrich's device. It was also found that moths of the first and second generation do not emerge at dusk but in the dark at a definite hour each month. No emergence took place when the mean day and evening temperatures were below 18° C., a temperature exceeding 20° C. being the optimum.—Inst. Obst- u. Gemüsebau, Martin Luther Univ., Halle-Wittenberg.

2505. Much, K.
Wird der Flug bzw. die Eiablage des Apfelwicklers durch Luftfeuchtigkeit beeinflusst? **(The effect of atmospheric humidity on flight and oviposition of the codling moth.)**
Obstbau, 1953, **72**: 184-5, from abstr. in *Z. PflKrankh.*, 1954, **61**: 92-3.

Observations in 1952 suggest that a sudden rise in humidity, at least after a dry period, favours flight and oviposition of codling moths.

2506. Böhm, H.
Ergebnisse mehrjähriger Bekämpfungsversuche gegen den Apfelwickler (*Carpocapsa pomonella* L.). **(Results of several years' tests on the control of codling moth.)**
PflArzt, 1953, **6** (8): 4-5.

Two applications were necessary for the control of the second codling moth generation, while one application controlled the first. DDT proved superior to lead arsenate and E 605.

2507. Živojinović, S.
Stanje gubarevih legala u istočnoj i jugoistočnoj Srbiji 1953 godine. **(Gypsy moth in eastern and south-eastern Serbia in 1953.)** [English summary 1½ pp.]
Zasht. Bilja, 1953, No. 20, pp. 94-102.

A team of experts investigating gypsy moth infestation recommended that this pest, found only in a few orchards, should be controlled by a kerosene and tar mixture.

2508. Reichart, G., and Szalay-Marzsó, L.
Az amerikai fehér szövőlepke (*Hyphantria cunea* Drury) elleni 1953, évi védekezési kísérletek. **(Experiments on the control of *H. cunea* in 1953.)** [English and Russian summaries.]
Növènyterm., 1953, **2**: 293-310, bibl. 10, illus.

Previous experiments having shown the superiority of DDT compounds for fall webworm control, large-scale field trials were conducted in 1953 on methods of application. Spraying was more effective than dusting, the best results being obtained with a dust moistened with a 20% oil emulsion in water. The work, described in detail, was carried out on the Hungarian Plain on roadside mulberry trees.

2509. MURUCCI, P. E.
The life cycle and control of cherry fruitworm on blueberries in New Jersey.
Proc. 22nd annu. Blueberry Open House, N.J. agric. Exp. Stat., 1953, pp. 10-14.

The life history of cherry fruitworm, which has recently become a serious pest of blueberries, is described in detail. Parathion dusts give good control, killing the moths and newly-hatched larvae, but timing of the application is important.

2510. HUTCHINSON, M. T.
Control of the cranberry fruitworm on blueberries.
Proc. 22nd annu. Blueberry Open House, N.J. agric. Exp. Stat., 1953, pp. 8-9.

The cranberry fruitworm [*Mineola vaccinii*] is not yet a serious pest of blueberries. It can be controlled on blueberries by 2 applications of parathion, a week apart, and certain other insecticides.

2511. BERVILLÉ, P., ROUSSET, P., AND LAVY, J.
Essais de traitement sur les "vers gris" de la vigne. **(Tests on the control of cutworms in vineyards.)**
Progr. agric. vitic., 1954, **141**: 141-5.

Chlorinated hydrocarbon baits, sprays and dusts were compared for the control of cutworms (*Euxoa tritici*) in vineyards. Baits gave the best results (79–93% and 87–89%). Foliage sprays were also efficacious (86–89% and 64–66%) but their residual effect was only 5 days and it was doubted whether they would give satisfactory protection against severe attacks. Dusts, incorporated with the soil or applied superficially at the base of the stem, gave the least satisfactory results, their efficacy against older cutworms, as a contact insecticide, being inadequate.

2512. JANCKE, O., AND BRÜCKBAUER, H.
Zur Sommerbekämpfung der Blattreblaus. **(The summer control of the leaf phylloxera.)**
Dtsch. Weinb., wiss. Beihefte (*Wein Wiss.*), 1953, **7**: 185 and 1954, **8**: 1, from abstr. in *PflSch. Ber. Wien*, 1954, **12**: 131.

Systox, Nexen and Perfektan, each at 3%, achieved a 100% kill of phylloxera in old and young galls on vine leaves. Two applications at one week's interval are recommended.

2513. ŽIVANOVIĆ, V.
Biologija šljivinih osa u zapadnoj Srbiji. **(The biology of sawflies in western Serbia.)** [English summary 1 p.]
Zasht. Bilja, 1954, No. 21, pp. 48-60, bibl. 9, illus.

The life history of *Hoplocampa flava* and *H. minuta*, attacking plums in important producing centres in western Serbia, is described. For the control of the sawflies, applications of insecticides containing BHC or phosphoric esters were found most effective.

2514. JOSEPOVITS, G., AND NAGY, B.
Védekezési kísérletek a poloskaszagú körtedárazs (*Hoplocampa brevis* Klg.) ellen. **(Trials on the control of *Hoplocampa brevis*.)** [English, German and Russian summaries.]
Növènyterm., 1953, **2**: 268-88, bibl. 15, illus.

The damage caused by *Hoplocampa brevis* to several pear varieties and methods of control used in 1953 are described. The best results were obtained with a 2% suspension of Agritox (BHC) applied 1–3 days after petal fall and an 0·1% solution of Ekatox (parathion). The destruction of infested fallen fruit is not advisable, as more useful parasites than sawfly larvae may thus be destroyed.

2515. ORTEGA, J. C.
Control of the frosted scale.
Calif. Agric., 1954, **8** (1): 10, illus.

Frosted scale, *Lecanium pruinosum*, infestations on walnuts in southern California have increased since the initial use of DDT, which also controls the frosted scale parasite, *Metaphycus californicus*. Control of this scale is best carried out in the dormant season, parathion being the most effective material. DDT–kerosene treatment has also given good results.

Fungicides.

2516. DAINES, R. H.
The behaviour of fungicides in grower and research programs in New Jersey.
St. hort. Ass. Pa News, 1954, **33** (1): 65-74.

A series of experiments showed that apple russeting from fungicides resulted chiefly from the pink and petal fall sprays. As regards effect on fruit finish, sprays acted differently with different varieties and to a certain extent varied in different years. Thus in 1953 there was no significant difference in fruit finish between the ferbam, captan or glyodine sprayed trees of the Red Delicious and Stayman varieties, whereas in 1951 and to a lesser degree in 1952 captan produced the fruit of finest finish on Stayman. The inclusion of acaricides in fungicidal sprays increased russeting on Golden Delicious fruit.

2517. HILBORN, M. T., AND PLUMMER, B. E., Jr.
The influence of various fungicides on the chlorophyll content of apple foliage.
From abstr. in *Phytopathology*, 1954, **44**: 111.

The chlorophyll content of fungicide-sprayed apple leaves was determined by a spectrophotometer. On McIntosh, sprays causing visible spray injury reduced chlorophyll by at least 16%. Even when no spray injury was visible, chlorophyll content was reduced. Some dithiocarbamates and iron salts usually caused an increase; manganese salts were erratic. Thiram with sulphur caused an increase of 43%. Glyodin caused a 4% decrease on McIntosh but a 63% increase on Red Delicious.

Therapeutants and insecticides.

(*See also* 2545g, t, v, 2546c, 2899, 2900, 2922c, h, k.)

2518. JANCKE, O.
Beiträge zur innertherapeutischen Schädlingsbekämpfung. IV. **(Contributions to the control of pests by therapeutants.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 38-41, bibl. 3, illus.

Young apple trees heavily infested with green apple aphid (*Doralis pomi*) were treated in the following manner: A bandage of linen sheeting and muslin, the latter soaked in a systemic insecticide, was placed round the stem 20–30 cm. above ground level and covered with a waterproof, plastic material. The chemicals used were systox and Bayer 4404 at concentrations of 10% and 50%. Five to seven days after the application the trees were completely free from aphis and remained so for 13 weeks, in spite of repeated attempts at re-infestation from the 15th day onwards. In the 4th week light leaf injuries occurred from which the trees soon recovered. In another series of experiments application of the same chemicals (5% and 10%) to 13-year-old apple spindle bush trees proved similarly successful against woolly aphid, though the action was somewhat slower. When tested 3 weeks after treatment fruits from these spindle bush trees were found to be non-toxic to *Drosophila* and white mice.—Landesanstalt. f. Wein-, Obst- u. Gartenbau, Neustadt/Weinstrasse.

2519. Belloni, V. G.
Repertorio dei fitofarmaci e guida alla lotta antiparassitaria. **(Inventory of products used in plant chemotherapy and guide to the control of parasites.)**
Scuole Arti Grafiche Artigianelli, Milan, [1953?], 6½×5 in., pp. 256.

This little manual is published under the auspices of the Società Italiana di Fitoiatria. It contains 9 articles by Professor Baldacci and Drs. Belloni and Grancini on various aspects of the chemical control of pests, diseases and weeds and includes: (1) a downy mildew incubation calendar; (2) an alphabetical list of insects and parasitic fungi with an outline of their control; (3) an alphabetical list of insecticides, fungicides, herbicides and ancillary compounds such as adjuvants with, in each case, the name of the manufacturing or distributing Italian firm, composition, uses, and method of use; (4) an index to the aforesaid chemicals divided into categories such as arsenicals and copper compounds; and (5) an appendix containing lists of compatible mixtures for important compounds, tables for the preparation and dilution of compounds, lists of Italian State laboratories and sub-stations, and the addresses of firms supplying the chemicals.

2520. MacPhee, A. W., and Sanford, K. H.
The influence of spray programs on the fauna of apple orchards in Nova Scotia. VII. Effects on some beneficial arthropods.
Canad. Ent., 1954, **86**: 128-35, bibl. 47.

From experimental results obtained in Nova Scotia, the toxic effects of sprays on beneficial orchard arthropods are tabulated. DDT, parathion, and sulphur have drastic effects on these natural enemies; nicotine, lead arsenate, summer oil, ovotran, phygon and ferbam are harmful to some species; Crag fruit fungicide, Tag 331, copper fungicides, and cryolite are relatively harmless. Results recorded in the literature are also tabulated.

2521. Raucourt, M., Viel, G., and Chancogne, M.
Étude des actions ovicides. IV. Toxicité des huiles at de diverses substances employées au laboratoire dans des conditions différentes. **(Ovicidal action. IV. The toxicity of oils and other substances tested in the laboratory under various conditions.)**
Ann Epiphyt., 1953, **4**: 459-66, bibl. 5.

The action was studied of 4 oils, anthracene, shale, petroleum and vegetable, of a lime-sulphur solution and of parathion on eggs of *Ephestia kuhniella*. Parathion was the most effective. There was some variation in results as between spraying and dipping and also between the effects on eggs of *Ephestia* and of *Operophtera brumata*: spraying gave the more satisfactory results.

2522. Chancogne, M., Grison, P., and Viel, G.
Étude des actions ovicides. V. Détermination au verger de l'action ovicide des produits pour traitement d'hiver des arbres fruitiers. **(Ovicidal action. V. Orchard determination of the ovicidal action of winter washes for fruit trees.)**
Ann. Épiphyt., 1953, **4**: 467-77, bibl. 13.

A description is given of a simple method of estimating the efficiency of winter-wash materials for fruit trees. The following results were obtained with it: Aqueous solutions of nitrophenols were very active against the caterpillars of the ermine moth, *Hyponomeuta* sp., but less so against eggs of the winter moth, *Operophtera brumata*. Aqueous solutions of DNC were the most efficient of the yellow oils; when used late in the season, they gave an almost complete control of both pests. *Operophtera* eggs were sensitive to white oils when near hatching, whereas *Hyponomeuta* eggs were resistant. Samples of anthracene oils used were not satisfactory. Rain did not decrease the efficiency of the preparations used.

2523. Metcalf, R. L.
Radiotracers in study of systemic insecticides.
Agric. Chemls, 1954, **9** (3): 33-5, 128-30, bibl. 8, illus.

The technique applied in these studies with schradan and systox showed promise—not only for fundamental research on the biochemical behaviour of these materials—but also for routine analytical residue determinations. The latter were carried out on apples, oranges and walnuts.—Univ. Calif., Riverside.

2524. Hard, M. M., and Ross, E.
Effect of malathion on flavor of certain fruits and vegetables.
J. agric. Food Chem., 1954, **2**: 20-2, bibl. 16.

From the results of tests in Washington State by a non-professional tasting panel on fresh and processed fruits and vegetables that had been treated with normal dosages of malathion it is concluded that this insecticide can be safely used on potatoes, beans, peas, sweet cherries, apples, peaches, pears and strawberries.

2525. Hartley, G. S.
Organo-phosphorus insecticides. The behaviour of schradan in the plant.
Chem. Ind. Lond., 1954, No. 19, pp. 529-32, bibl. 12.

Discusses the breakdown of schradan in the plant and the possible toxicity of its derivatives to the consumer.

2526. Kampmeier, C., and Haag, H. B.
Toxicological considerations in use of dithiocarbamates.
Agric. Chemls, 1954, **9** (4): 49-50, 133, bibl. 6.

Zineb and nabam apparently offer no significant toxicologic hazards to the agricultural worker. Zineb residues on treated food crops range from 0 to 13 p.p.m. It appears unlikely that the 1 p.p.m. or less of zineb which might appear in the total human diet would afford a hazard to the consumer. Nabam is not used alone and does not appear as spray residue and hence poses no problem from this standpoint. However, it is a compound of moderate toxicity and care should be taken to avoid accidental ingestion. Nabam is a sensitizing agent, and skin and eye contact should be avoided. [Authors' summary.]

2527. Satyanarayana, P.
The insecticidal efficiency of DDT deposits applied to apple foliage as solutions or emulsions.
J. hort. Sci., 1954, **29**: 112-25, bibl. 9.

Apple leaves absorb DDT strongly, but almost complete recovery of DDT applied as solution, emulsion or suspension, is obtained by prolonged shaking with benzene; stripping with benzene gave only partial recovery. The nature of the solvent used in solution affects recovery, but in emulsions there is no such effect and the nature of the emulsifying agent is not important. Emulsions containing high or very low amounts of organic solvent leave larger deposits on the surface than those with intermediate percentages. The proportion of DDT remaining on the leaf-surface varies with the concentration of DDT applied. Summer weathering of leaf deposits showed that deposits of less than 12 μg. per sq. cm. would become non-toxic to *Tribolium confusum* after a week, but deposits of more than 50 μg. per sq. cm. caused complete kill of the insect after 28 days' exposure. [From author's summary.]—East Malling Res. Stat.

2528. Häfliger, E.
Zur Wirkungsweise von DDT-γ-HCH-Kombinationspräparaten. **(The action of combined preparations of DDT and γ-BHC.)** [English summary 10 lines.]
Z. PflKrankh., 1954, **61**: 139-43, bibl. 11.

In tests on cockchafers it was found that combined preparations of DDT and γ-BHC are largely independent of the limitations imposed on their action by temperature, while each of the two chemicals applied by itself is effective only within a certain temperature range. The insecticidal action of the constituents was additive.

2529. Mitchell, L. C.
Separation and identification of chlorinated organic pesticides by paper chromatography. IV. The components of dilan.
J. Ass. off. agric. Chem. Wash., 1954, **37**: 216-17, bibl. 5.

Dilan consists primarily of 1 part prolan (2-nitro-1, 1-bis (*p*-chlorophenyl) propane) and 2 parts bulan (2-nitro-1, 1-bis (*p*-chlorophenyl)) butane). The procedure for separation is described.

Spraying technique.

(*See also* 2201, 2545y, z.)

2530. Zobrist, L.
Rebspritzung mit dem Helikopter, Aussichten für die praktische Anwendung. **(Spraying vines by helicopter, prospects of practical application.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 171-5, bibl. 3, illus.

Evaluating the results of tests carried out in 1953 [see *H.A.*, 23: 4092] the author comes to the conclusion that the use of a helicopter for spraying vines is economical only under the following conditions: (1) the terrain must be flat or only slightly sloping; (2) the area to be treated must be continuous and must exceed 50 hectares; (3) a central landing place and (4) an experienced pilot must be available.

2531. Organisation for European Economic Co-operation.
The use of aircraft in agriculture in the U.S.A.
[*Publ.*] *O.E.E.C.* **TAR/107(53)1,** 1953, pp. 103, bibl. 19, illus.

This is the report of an O.E.E.C. Mission which visited the U.S.A. in May 1952 to study the use of aircraft in agriculture in that country with a view to fostering the development of agricultural aviation in Western Europe where it is of fairly recent origin and aircraft is used on a very much smaller scale. The Mission believed that, although it is unlikely that agricultural aviation in Western Europe will develop as widely or on the same lines as in the U.S.A. because of the difference in agricultural and other conditions, there is nevertheless considerable scope for the greater use of aircraft in Europe. The horticultural crops offering the greatest possibilities are olives and other fruit trees. Aircraft could be more widely used for controlling *Dacus oleae*, *Ceratitis capitata*, *Cydia pomonella* and other fruit tree pests. In the U.S.A. helicopters have proved too expensive for use in extensive agriculture but under European conditions, where intensive agriculture is practised, machines with a payload of about 500 lb. and costing about $10,000 might be an economic proposition. The Mission makes various recommendations.

2532. Large, J. R.
Aeroplane spraying for pecan scab control.
Plant Dis. Reptr, 1953, **37**: 266-8, bibl. 2.

During the dry summer of 1952, 5 aerial applications of 18X zineb (parzate) made between 14 April and 25 July gave fair control of pecan scab (*Cladosporium effusum*), particularly in the upper parts of the trees. Control in the lower parts of the trees was much less effective than with ground spraying.—Fla agric. Exp. Stat.

2533. Yeoman, A. H., and VanLeeuven, E. R.
Explosion characteristics of insecticidal aerosols.
Agric. Chemls, 1954, **9** (4): 75, 77, bibl. 2.

Precautions for the prevention of explosions in large insecticidal aerosol machines for indoor treatment are discussed and data are tabulated on quantities of various solvents or oils required to produce an explosion in a test drum.

2534. Peyer, E., and Huber, H.
Prüfung neuer Spritzverfahren im Rebbau. **(New spraying techniques tested in the vineyard.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 163-71, bibl. 1, illus.

Centrally operated high-pressure spraying installations covering many vineyards proved both efficient in the control of downy mildew and moths and economical to the growers. The tests reported were carried out in two regions. Low-volume spraying, on the other hand, was not so successful.

2535. Adams, R. E., and others.
A flexible-outlet mist sprayer.
Bull. Cornell agric. Exp. Stat. **904,** 1954, pp. 15, illus.

A small orchard sprayer suitable for use as a mist-concentrate sprayer or as a dilute sprayer has been developed, with a flexible, hand-operated outlet. Good control of sour cherry leaf spot and apple scab has been obtained with it, and the fungicidal deposit is satisfactory. Its use and construction are also described.

2536. Trickett, E. S., and Courshee, R. J.
A spray deposit analyser.
Rep. nat. Inst. agric. Engng **27,** 1953, pp. 35, bibl. 14, illus.

The design, testing and use in practice of a machine for measuring spray deposits is described. The project was begun because sizing and counting spray droplets by eye is slow and tedious, and a principal aim of the analyser was to increase the speed and remove the boredom of counting. It is designed to work with circular images of a range of sizes and when provided with information in this way it measures with an error less than 0·05 mm. which is 10% of the smallest and 0·6% of the largest size measured. The errors, advantages and disadvantages of the present analyser are described and discussed and the lines of future work indicated. [Authors' summary.]

2537. Courshee, R. J.
Testing a spray deposit analyser.
Tech. Mem. nat. Inst. agric. Engng **100,** 1954, pp. 11, bibl. 2, illus.

The method of using the counting machine [see preceding abstract] is described. The accuracy obtainable with it proved greater than that resulting from counting by eye with the aid of a microscope.

2538. Courshee, R. J., and Byass, J. B.
A study of the methods of measuring small spray drops.
Rep. nat. Inst. agric. Engng **31,** 1953, pp. 8, bibl. 3, illus.

Several existing techniques for measuring drop size were investigated and their limitations are described. The method finally adopted for water sprays is based on the collection of drops in a cell containing a grease mixture. By placing the cell in the centre of the surface under test, stain size on this surface can be directly related to spherical drop size in the grease.

2539. Küthe, K.
Der Einfluss der Spritztropfengrösse auf den Erfolg einer Schädlingsbekämpfung. **(The influence of droplet size on the action of plant protective sprays.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 51-5, bibl. 9.

The droplet size to be aimed at in low-volume applications (100–200 l./ha.) of fungicides and insecticides is a diameter of 200–300 μ, 400 and 100 μ being the upper and lower limits respectively. With herbicides the droplet size should be large to increase the quantity of active agent per unit area. It is not advisable to reduce the amount of concentrate spray applied below 100 l./ha.

Spray residues.

(*See also* 2545a.)

2540. Ministry of Agriculture, London.
Toxic chemicals in agriculture. Residues in food.
H.M. Stationery Office, London, 1953, pp. 32, 1s. 6d.

A report of the working party on the extent to which toxic chemical residues in food constitute a risk to the consumer, and their recommendations.

2541. Hills, C. H., and others.
Ferbam residues on canned Montmorency cherries.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 261-6, bibl. 7.

Residues on Montmorency cherries, commercially sprayed with ferbam, amounted to approximately 2 p.p.m. at harvest and 0·5 p.p.m. when canned. They had no adverse effect on the colour, flavour or storage life of the canned produce.

2542. Westlake, W. E., and Butler, L. I.
Residues of malathon on fruits and vegetables.
J. econ. Ent., 1953, **46**: 850-2.

Deposits of malathon are lost very rapidly from fruits and vegetables in the Pacific Northwest. Residues on apples and pears were less than 0·5 p.p.m. 14 days after spraying; on peaches they were higher, 1 and 2 p.p.m., but only traces remained at harvest. Residues were no more than a trace on snap beans, cucumbers and broccoli after 6 days, and on spinach after 12 days.

2543. Clark, P. J., and Jacks, H.
Arsenic and lead residues on apples.
N.Z. J. Sci. Tech., Sect. B, 1954, **35**: 311-14, bibl. 2.

Apples sprayed with six applications of lead arsenate during the season were found to contain residual arsenic in excess of the permitted limit of 1·5 p.p.m. (expressed as arsenious oxide) and residual lead in excess of twice this figure. Residues of arsenic from arsenical sprays applied not later than the end of December did not exceed the limit. [Authors' summary.]

2544. Keller, H.
Über den Einfluss von Bodenvergiftungen mit DDT- and Hexa-Mitteln auf die Collembolenfauna. **(The effect of soil poisoning by DDT and BHC preparations on the collembola fauna.)**
Inauguraldiss. J. W. Goethe-Univ., Frankfurt/Main, 1952, from abstr. in *PflSch. Ber. Wien,* 1954, **12**: 62.

After rain insecticides applied to trees, bushes or annual crops were shown to be washed into the soil where they killed the microfauna. Residual toxicity in the soil generally lasted a year in the case of arsenic and 3 weeks in the case of DDT and BHC.

Noted.

2545.

a Asquith, D., and Lewis, F. H.
Russeting of Stayman and Golden Delicious apples by certain pesticides applied in the petal fall and first cover sprays.
St. hort. Ass. Pa News, 1954, **33** (1): 61-4.
Of materials tested captan caused the least russeting.

b Bernard, J.
Recherches sur les Tenthredinidae. V. Note sur deux espèces occasionnellement nuisibles aux fraisiers (*Cladius pectinicornis* Geoff. et *Emphytus cinctus* L.). (**Studies of Tenthredinidae. V. A note on two species occasionally injuring strawberries (*Cladius pectinicornis* and *Emphytus cinctus*.)**)
Parasitica, 1954, **10**: 18-20, bibl. 5.

c Brian, P. W.
The use of antibiotics for control of plant diseases caused by bacteria and fungi.
J. appl. Bact., 1954, **17**: 142-51, bibl. 60.

d Commonwealth Institute of Biological Control (Thompson, W. R.).
A catalogue of the parasites and predators of insect pests. Section 2. Host Parasite catalogue. Part 2. Hosts of the Hymenoptera (Agaonidae to Braconidae), 1953, pp. 190, obtainable from Commonwealth Agricultural Bureaux, Central Sales Branch, Farnham Royal, Slough, Bucks., England, 20s.

e Darpoux, H., and Perrot, A.
Mise au point sur les procédés de lutte contre les tavelures du pommier et du poirier. (**Improvements in the control of apple and pear scabs.**)
Bull. Comité rég. Arboric. fruit. S.N.H.F. **5**, reprinted in *Arboric. fruit.*, 1954, No. 2, pp. 9-10.
In the Paris area.

f Dayton, D. F., Shay, J. R., and Hough, L. F.
Apple scab resistance from R12740-7A, a Russian apple.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 334-40, bibl. 2, illus.
Malus pumila used as a source of scab resistance in breeding.

g Dimond, A. E., and others.
Plant chemotherapy as evaluated by the fusarium wilt assay on tomatoes.
Bull. Conn. agric. Exp. Stat. **557**, 1952, pp. 82, illus. [received 1954].

h Doehlert, C. H.
Adapting the use of fertilizer to drought injury [in blueberries].
Proc. 22nd annu. Blueberry Open House, N.J. agric. Exp. Stat. 1953, pp. 2-5.

i Fernqvist, I.
Frostskador på fruktträd i övre Norrland. (**Frost damage to fruit trees in upper Norrland, Sweden.**)
Sver. pomol. Fören. Årsskr. 1953, 1954, **54**: 153-7, illus.
Symptoms of winter injuries to apple trees.

j van Geit, P.
La tenthrède du groseillier (*Pteronus ribesii* Scop.). (**Gooseberry sawfly.**)
Bull. hort. Liège, 1954, **9**: 112-15.
Biology and control of *Pteronus* (*Pteronidea*) *ribesii*.

k Graniti, A.
Osservazioni di campo sulla distribuzione, l'importanza economica e la sintomatologia della degenerazione infettiva della vite in Sardegna. (**Field observations on the distribution, economic importance and symptomatology of infectious degeneration of the vine in Sardinia.**) [English summary 3 lines.]
Riv. Fruttic., 1954, **16**: 56-67, illus.
Mainly symptomatology.

l Hardman, J. A.
The summer fruit tortrix moth, *Adoxophyes orana* (Fisch. v. Roesl.), in Britain: a review of available information.
Entomologist, 1953, **86**: 264-72, bibl. 26.
Occurrence, life history, parasites and control.

m Harris, W. D., and Zukel, J. W.
Chemical structure of a series of organic sulfites and its toxicity to the two-spotted spider mite [*Tetranychus bimaculatus*].
J. agric. Food Chem., 1954, **2**: 140-2, bibl. 3.

n Heggli, M.
Virusproblemet i bringebaer. (**The virus problem in raspberries.**)
Frukt og Baer, 1954, **7**: 57-68, bibl. 29, illus.
A review of the literature with illustrations of symptoms.

o Horber, E.
Massnahmen zur Verhütung von Engerlingsschäden und Bekämpfung der Engerlinge. (**White grub control.**)
Mitt. schweiz. Landw., 1954, **2**: 34-52, illus.

p Hough, L. F., Shay, J. R., and Dayton, D. F.
Apple scab resistance from *Malus floribunda* Sieb.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 341-7, bibl. 5, illus.
Methods developed in breeding for scab resistance.

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Zur Rolle von *Cetonia aurata* L. als Obstschädling. (***Cetonia aurata* as a pest of fruit.**)
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A rose chafer feeding on ripe pear fruits. See also *H.A.*, 24: 1380.

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Ein einfaches Labor-Prüfverfahren für Nematozide. **(A simple method of testing nematocides in the laboratory.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1954, **8**: 9-13, bibl. 12, illus.

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Over infectie- en incubatieperioden van appelschurft. **(The infection and incubation periods of apple scab.)**
Fruitteelt, 1954, **44**: 352-3.
The application of the Mills table to conditions in Holland.

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Die Toxikologie des Phosphorwasserstoffes und die gesetzlichen Bestimmungen für seine Anwendung unter besonderer Berücksichtigung der Schädlingsbekämpfung. **(The toxicology of hydrogen phosphides and the regulations governing their application, with special reference to pest control.)**
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Effects of antibiotics in control of plant diseases.
J. agric. Food Chem., 1954, **2**: 234-9, bibl. 84.
A comprehensive though compact review.

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Enfermedades controladas con los tratamientos invernales en frutales de semilla y carozo. **(Diseases of pome and stone fruits controlled by winter treatment.)**
Publ. Lab. Fis. Pat. veg. Montevideo **104,** 1953, pp. 20, illus.

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Pear and cherry slugworm.
Adv. Leafl. Minist. Agric. Lond. **84,** amended 1954, pp. 3, illus.
Caliroa cerasi and its control.

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The anar-butterfly, *Virachola isocrates* Fabr.
Indian Fmg, 1954, **4** (1): 8-9.
The life history and control of a pest of the pomegranate.

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Ontario spray calendar for apples.
[*Publ.*] *Fruit Branch, Ontario Dep. Agric.*, 1954, 1 large sheet.

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1954 supplement to the manual for scab and insect control in apple orchards.
[*Publ.*] *Dep. Ent., Ontario agric. Coll., Guelph*, 1954, pp. 10.
To be used in conjunction with the calendar [see preceding note].

2546.

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Smoke pollution and plants.
N.A.A.S. Quart. Rev., 1954, No. 23, pp. 93-9, bibl. 13.
A review of the problem in the U.K. and a plea for collaboration in solving it.

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Apple and peach spray schedules for 1954.
[*Publ.*] *Pa agric. Ext. Serv.*, 1954, pp. 19.

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Safety in insecticide use.
Agric. Chemls, 1954, **9** (4): 34-7, 133.
Hazards to workers discussed and precautions suggested.

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Planung in der Maikäferbekämpfung auf Grund einer Befallskartierung in den einzelnen Gemeinden. **(The planning of cockchafer control on the basis of maps drawn in each parish.)**
Mitt. schweiz. Landw., 1954, **2**: 17-34, illus.

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Biologisch-ökologische Untersuchungen an *Byturus tomentosus* Fabr. und *fumatus* Fabr. **(Studies on the biology and ecology of *Byturus tomentosus* and *B. fumatus*.)**
Beitr. Ent., 1953, **3**: 627-52, bibl. 18, illus.

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Über die Wirkungsdauer von Hexamitteln bei der Engerlingsbekämpfung. **(Residual toxicity of BHC preparations in white grub control.)**
Z. PflKrankh., 1954, **1**: 9-17, bibl. 13.

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***Rhagoletis cingulata* on wild and cultivated cherries in eastern Washington.**
J. econ. Ent., 1953, **46**: 896-7, bibl. 6.

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Insect pests of the peach in the Eastern States.
Fmrs' Bull. U.S. Dep. Agric. **1861,** revised 1954, pp. 32, illus.
Life histories, damage and control, and notes on insecticides.

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Die Serologie in ihrer Bedeutung für die Erforschung pflanzlicher Virosen und deren Bekämpfung. **(The significance of serology in the study of plant virus diseases and their control.)**
Landw. Forschung, 1953, Sonderheft, **4,** pp. 170-80, bibl. 60.

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Sprøjtning mod bladlus og spindemider. **(Spraying against aphids and spider mites.)**
Tidsskr. Planteavl, 1954, **57**: 353-4.
Small-scale trials with systemic and contact insecticides.

k VAN DE VRIE, M.
Parathion-resistentie van het fruitspint. **(Parathion resistance in fruit-tree red spider mite.)**
Tijdschr. PlZiekt., 1954, **60**: 78.

l VUČENOVIĆ, A., PETROVIĆ, N., AND MINIĆ, M.
Zapažanja o nekim virozama voćaka u našim rasadnicima. **(Observations on some virus diseases of fruit trees in Yugoslavia.)** [English summary 13 lines.]
Zasht. Bilja, 1954, No. 21, pp. 42-7, bibl. 11.
In plum, fig, apricot and apple nurseries in Yugoslavia in 1952.

m WELCH, J. F.
A review of chemical repellents for rodents.
J. agric. Food Chem., 1954, **2**: 142-9, bibl. 30, illus.
Used or tested against rats, mice, rabbits and deer.

n WILHELM, A. F.
Wie sieht Magnesiummangel bei der Rebe aus? **(The symptoms of magnesium deficiency in vines.)**
Dtsch. Weinb., 1954, No. 4, p. 85, from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1954, **4**: 143.
Symptoms, diagnosis and cure.

WEEDS AND WEED CONTROL.

General.

(*See also* 2120.)

2547. BRITISH WEED CONTROL CONFERENCE.
Proceedings of the British Weed Control Conference 1953, Margate, 1953, $8\frac{1}{2}\times6\frac{1}{2}$ in., pp. 484, obtainable from British Weed Control Conference, Cecil Chambers, 86 Strand, London, W.C.2, 30s.

This volume, some of the papers in which are abstracted separately, contains the report of the Recommendations Sub-Committee with regard to particular weeds and the control of weeds in vegetables and other crops. It is to be regretted that the Proceedings are so bound as to entail maximum discomfort to the reader, a persistent effort being necessary to keep the book open at any particular page.

2548. ROCHECOUSTE, E.
Les herbicides sélectifs et leur application dans la pratique agricole. **(Selective herbicides and their use.)**
Rev. agric. Maurice, 1953, **32**: 327-42, bibl. 7.

The author reviews various aspects of chemical weed control ranging from the structure of the chemicals to practical considerations concerning pre- and post-emergence application and the rotation and mixture of herbicides. He gives a practical guide in diagrammatic form to chemical weed control in sugar cane in Mauritius. The application of sodium chlorate to old regrowth in a replanting area some months before planting the cane is followed, some weeks after planting, by pre-emergence spraying with MCPA or DCPA and later by further pre-emergence treatments of annual grasses and post-emergence treatment of perennial grasses. Rates are given in all cases. [See also *H.A.*, 24: 396.]

2549. CRAFTS, A. S.
Absorption and translocation of herbicides.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 73-6.

Literature on movement within the plant is briefly reviewed and results are discussed of absorption and translocation studies with labelled 2,4-D, which indicate that seedlings may be treated at relatively earlier growth stages than old plants, that treatment must occur at a time when foods are being moved to active roots, that concentration of the herbicide will have no effect on linear rate of transport, though it may affect the amount moved, that favourable location of the spray may affect the quantity of herbicide moved and that plants in a condition of moisture deficit may allow the chemical to move though they may not respond. [See also *H.A.*, 23: 4098.]

2550. HOLLY, K.
Morphological effects on plants due to damage caused by growth-regulator weed-killers.
Plant Path., 1954, **3**: 1-5, bibl. 10, illus.

Distortions and malformations of stems, leaves, roots, flowers and fruits are described.

2551. WESLEY, R.
Weed infested gravel verges.
J. Pk Adm., 1954, **18**: 412-18, illus.

Effective destruction of weeds on 35 miles of gravel verges in the Borough of Southgate was obtained by spraying with a 10% solution of a mixture consisting of 2 parts sodium chlorate and 1 part calcium chloride, the latter being introduced to reduce the fire hazard. Attempts to remove the dead weeds with flame guns were unsuccessful and manual removal with hoes and rakes proved necessary. An experiment on the use of bitumen emulsion to aid in the establishment of grass on a gravel verge proved successful and economical. Costs are given.

2552. BROWN, J. W.
A root elongation test for herbicide screening.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 53-5, bibl. 5.

A technique is described for germinating seeds in herbicide-treated seed rolls at 78° or 84° F. for 72 or 96 hours (depending on species) and then measuring the root lengths.

2553. JACOB, W. C.
Field plot technique and statistical analysis for weed control experiments.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 35-7.

Size and shape of experimental plots, number of observations made, experimental designs and analysis of data are discussed, and it is recommended that, where possible, separate experimental and demonstration weed plots should be planted and that all tests should be properly duplicated.

2554. Hall, J. A.
A mechanical method of weed control.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 63-4.

A system of discs that cultivate the inside and outside slopes and the top of canal banks in one operation has been developed and is used successfully for weed control in one Irrigation District in California.

2555. Kent, R. L.
Mechanical control of weeds in ditches.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 71-3.

The equipment used in the James Irrigation District includes a mower, a roller and a power fork.

Herbicides.

(*See also* 2621a-e, g-i.)

2556. Frans, R. E., and Aldrich, R. J.
Herbicidal comparisons between sodium arsenite and several experimental arsenical compounds.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 17-22, bibl. 5.

A comparison of 16 experimental arsenical compounds with sodium arsenite under field and laboratory conditions showed that 12 of these compounds were as effective as sodium arsenite. The arsenic content of the spray solution and the method by which the spray solution is fortified seem to be more important than the arsenic compound used in determining the effectiveness of arsenical herbicides. [Authors' summary.]

2557. Valleau, W. D.
A probable solution of the calcium cyanamide problem in tobacco bed weed control in Kentucky.
Plant Dis. Reptr, 1953, **37**: 410.

Calcium cyanamide gives good weed control in tobacco seed beds, but, whereas in some areas the tobacco seedlings grow normally, in others they turn yellow and become stunted. A survey suggests that tobacco in treated beds is benefited by: (1) heavy watering, (2) an application of phosphate at the time of treatment, (3) turning under a heavy cover crop before treatment, and (4) mulching after treatment. The favourable response to these practices supports the theory that the cause of cyanamide injury to small plants is excess ammonia (or urea which precedes it).

2558. Wolf, D. E.
CMU—its use as a herbicide.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 77-9.

CMU applied at high rates is a very satisfactory soil sterilant. At comparatively low rates of from 2 to 5 lb. per acre it gives very good weed control when used as a pre-emergence treatment in sugar cane and pineapple. The chemical has also shown promise for controlling weeds in asparagus, onions, beets and peas.

2559. (Day, B. E.)
Weed control experiments.
Calif. Citrogr., 1954, **39**: 258-9.

In California, CMU, applied for weed control 3 years ago at 50 lb. per acre, has failed to show any signs of injury to citrus trees. Suggestions are made for its experimental use by growers.

2560. Danielson, L. L., and Easley, L. W.
Progress report on the crop toxicity period of CMU in a sandy loam soil.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 11-15.

The effects of 12 treatment levels of CMU applied 1, 2 and 3 months before sowing on average stand and average weight of both irrigated and unirrigated sweet corn, snap beans, kale and spinach are tabulated, and meteorological records for the experimental period are given. Results in general indicate a gradual diminution in toxicity with the passage of time.

2561. Woodford, E. K.
CMU, exploratory experiments under British conditions.
Proc. British Weed Control Conf. 1953, Margate, pp. 319-27, bibl. 7.

CMU applied pre-emergence, even at rates of 0·25 and 0·5 lb. per acre, gave very good control of annual weeds in vegetables [see also *H.A.*, 23: 4119]. Large-seeded crops, such as peas and beans and certain others, notably carrots, beets and spinach were found relatively tolerant to the chemical. Weeds so far found most susceptible are shepherd's purse, annual poa, chickweed and fat hen.

2562. Bernard, G. E.
Use of "Crag" Herbicide 1.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 93-6.

Crag Herbicide No. 1 (sodium 2-(2,4-dichlorophenoxy) ethyl sulphate) becomes active upon contact with the soil under moist conditions and should be applied before weed emergence. For the 1953 season it has been approved for weed control in strawberries, raspberries, asparagus, sugar cane, certain evergreen shrubs, trees, flower crops and bulb and tuber plants.

2563. Baskin, A. D., and Walker, E. A.
A biological method for the determination of extent of volatility of 2,4-D and/or 2,4,5-T.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 47-50, bibl. 2.

The technique consisted of growing tomato plants to 4–5 leaf stage in dispensable containers and exposing them to vapours of 2,4-D and/or 2,4,5-T ester formulations in a forced air system for 2, 4 and 16 hours at room temperature (70–75° F.). Volatility was measured from the epinasty and more advanced formative responses of the test plants. The results have shown that the sodium salt of 2,4-D and the iso-octyl, butoxyethanol, butoxyethyl, polypropylene glycol and tetrahydrofurfuryl esters of 2,4-D and/or 2,4,5-T are low-volatile preparations. The volatile esters have been found to be the methyl, ethyl, propyl, butyl, amyl and pentyl series. The amines were not tested.

Particular weeds.

2564. Stephens, R.
Experimental work on the control of bracken in the West of Scotland.
Proc. British Weed Control Conf. 1953, Margate, pp. 249-56, bibl. 11.

Mechanical and chemical treatments of bracken on land too rocky or uneven to be ploughed are described. The mechanical proved the more economical method of control.

2565. Day, B. E., and Russell, R. C.
Cultural and chemical control of nutgrass.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 87-9.

The authors recommend deep tillage of dry soil for control of large infestations of nutgrass, *Cyperus rotundus*, and liquid fumigation with chlorobromopropene, D-D and ethylene dibromide for spot treatment of small infestations.

2566. Orsenigo, J. R., and Smith, O.
The chemical control of northern nut grass, *Cyperus esculentus*.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 329-39, bibl. 4.

A brief summary of some of the results obtained during 3 years' work on the chemical control of nutgrass, mainly with TCA. A more detailed report is promised.

2567. Bordeleau, R.
Observations sur la destruction du souchet comestible. **(Notes on the destruction of chufa (*Cyperus esculentus*).)**
Rev. d'Oka, 1954, **28**: 8-10.

Six herbicides were tested in experiments on the control of *Cyperus esculentus* in vegetable crops begun at L'Assomption Federal Experiment Station in 1946. Among these only TCA (100 lb. per acre) and CMU (10 lb.) gave a complete kill with no regrowth. Both were slow-acting. Neither had toxic residual effects.

2568. Pryor, M. R.
Report of some chemical trials on quackgrass in nursery plantings.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 5-8.

Maleic hydrazide, 3,6-endoxohexahydrophthalic acid and CMU all failed to control *Agropyron repens* in nursery boxes of Irish yew and magnolia and in established plantings of magnolia, but CMU applied at 10, 20, 40 and 80 lb. per acre eradicated it in a nursery storage area.

2569. Jovanović, B.
Obezvodnjavanje zemljišta u cilju uništavanja divljeg sirka. **(Dehydration of the soil for the purpose of destroying Johnson grass.)**
[English summary 1½ pp.]
Zasht. Bilja, 1953, No. 20, pp. 21-42, bibl. 14, illus.

Laboratory investigations and field experiments at Zemun-Polje, near Belgrade, have shown that drying out the upper 20 cm. soil layer, where the largest mass of rhizomes is to be found, gives very good control of Johnson grass, *Sorghum halepense*. This can be achieved by deep ploughing in July or August.

2570. Schweers, V. H.
Johnson grass control on ditchbanks.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 69-71.

Soil sterilants such as chlorax, Polybor chlorate, Borascu and sodium TCA showed promising control of Johnson grass on ditch banks.

Control of aquatic weeds.

(*See also* 2555.)

2571. Balcom, R. B.
Control of aquatic weeds.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 5-9.

Both mechanical methods, still necessary under certain conditions, and chemical methods of controlling water weeds are discussed. Algae can be controlled by copper sulphate or a new formulation, rosin amine D acetate, but for the control of seed-producing plants like pondweeds a chlorinated hydrocarbon, Benochlor, and more recently aromatic solvents derived from coal tar and petroleum are used. In the Imperial Valley of California cat-tails (*Typha* spp.) at the early heading stage, are controlled by 1 lb. of sodium 2,4-D and 10 lb. of TCA plus an ionic emulsifier in 100 gal. applied at 300 gal. per acre, and in Utah with 4 lb. of 2,4-D as low-volatile ester plus 10 gal. of diesel oil in 320 gal. per acre. Spray equipment used for waterweed control is mentioned.

2572. Wilson Jones, K.
Control of water weeds.
A.R. Res. Div. Minist. Agric. Sudan 1950/51, pp. 51-5.

Large-scale trials were made with Fernoxone applied [a previous report gives the concentration as 10 p.p.m. active principle in canal water] by sprinkling mixed with silt. Application began on 1 April and virtually eradicated weeds from the treated canals in Turabi subdivision up to December, while neighbouring untreated canals showed infestation in varying degree from August onwards. Problems were (1) the phenolic flavour imparted to the water, (2) the unpleasant flavour developed by fish in treated waters and (3) dead and dying weeds and their decomposition products. Weed species in the Turabi subdivision in order of importance at the time of application were *Potamogeton crispus*, *P. perfoliatus*, *Chara globularis*, *P. nodosus*, *P. pectinatus* and *Najas pectinata*.

2573. Hodgson, J. M.
Controlling ditchbank and waterweeds.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 53-9.

Applications of 160 gal. per acre of aromatic oils, Shell 20, Standard 2 and diesel oil fortified with 2½% pentachlorophenol, gave good control of miscellaneous ditchbank vegetation for 2 months, which under some short-term cropping systems was sufficient to allow free run of irrigation water. Lower rates of application resulted in earlier re-growth and necessitated re-spraying. In another trial CMU applied at 40 lb. per acre in March, before the water was turned on suppressed vegetation for 2 seasons. Specifications and methods of application are given of aromatic solvents which were found effective for controlling aquatic weeds. Crop plants, including beans and carrots, were unaffected when irrigated with treated water, but fish and other aquatic animal life are killed by contact with the solvents. Notes are also given on control of cat-tail (*Typha* spp.). [See also abstr. No. 2571.]

2574. Fudge, O. L.
Summary of weed control work by Imperial Irrigation District.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 59-62.

Notes on attempts to keep irrigation water flowing freely in 1,362 miles of drains and 1,750 miles of canals, the latter also supplying domestic water, by suppressing vegetation through combined burning and chemical-aromatic oil methods.

Control of woody plants.

2575. BECKLEY, M. S.
Killing of trees and large brush by the basal chemical spray method.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, p. 23.

Two oak species and bay were killed in 30 days by spraying the basal 14 in. of stem with 1 part of 2,4,5-T in 8 parts of diesel oil applied at 1 pt. per 25 in. circumference. The spraying treatment appears to be successful all the year round and is recommended. If a quicker kill is desired, the bark should be chipped to the cambium to allow a faster rate of absorption.

2576. WAYWELL, C. G.
Report on investigations in hawthorn control.
Proc. 7th annu. Mtg. N.E. Weed Control Conf. 1953, New York, pp. 297-302, bibl. 2.

The species of hawthorn growing in western Ontario (*Crataegus punctata*), was controlled by foliage sprays of the amine and sodium salts and the isopropyl ester of 2,4-D at 1,000 to 4,000 p.p.m. applied at flower-bud or full-bloom stages. For basal bark treatment 2,4-D butyl ester in oil was found very satisfactory. Stump treatments with 2,4-D and/or 2,4,5-T in fuel oil, particularly when given in August within a few hours of cutting, prevented re-sprouting in most cases. [See also *H.A.*, 23: 574.]

2577. BRAMBLE, W. C., WORLEY, D. P., AND BYRNES, W. R.
Effect of placement of dormant basal spray on top-killing and sprouting of scrub oak.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 309-11, bibl. 5.

In central Pennsylvania, 2,4,5-T in kerosene applied in March to the root collar, or base of stem and root collar, caused 100% top kill and prevented sprouting of oak. Basal application alone, even when run off to the root collar occurred, gave only partial control of sprouting.

2578. HAY, J. R., AND THIMANN, K. V.
Translocation of 2,4,5-T in Cuban marabu.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 303-7, bibl. 4.

Studies conducted in Cuba on marabu [*Dichrostachys nutans*], indicate that the only treatment causing detectable movement of 2,4,5-T into the roots was application to the cut surface of very short stumps. [See also *H.A.*, 20: 1593, 21: 1603y and 22: 1489.]

2579. BEATTY, R. H.
Chemical brush control in the East.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 89-93.

Mainly with 2,4-D and/or 2,4,5-T applied to foliage, base, stump or frill.

2580. BLAIR, B. O., AND GLENDENING, G. E.
Intake and movement of herbicides injected into mesquite.
Bot. Gaz., 1953, **115**: 173-9, bibl. 8, illus.

Aqueous solutions of 2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid, eosin, sodium chlorate, ammonium sulphamate and sodium arsenite were injected for 1 minute into stems of velvet mesquite (*Prosopis juliflora* var. *velutina*). Injections were made in April, July, August and December in the early morning and mid-afternoon, and in August additional injections were made for periods varying from 10 seconds to 48 hours. Results showed that the maximum uptake by the trees was in December, during dormancy, and that downward transport, although limited, was also greatest in December. Solution intake was greatest in the afternoon, and organic materials were absorbed in greater volume than inorganic materials. Only sodium arsenite was toxic in the small quantities injected in the 1-minute period, but in the 2-hour period the entire tops of 7 out of 10 treated trees were killed. 2,4-D, although readily absorbed, was transported in lethal quantities only to the stem directly above the point of injection. Eosin dye at 0·2% was similarly transported upwards.

Weed control in ornamentals and turf.

2581. SCIARONI, R. H.
Weed control in flower crops.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 3-5.

In San Mateo county, California, the contact herbicides pentachlorophenol, Dow or Sinox General, Avon Weed Killer (Annalos 7), disodium 3,6-endoxohexahydrophthalate and oils are most commonly used for weed control in flower crops. Suitable formulations and methods of application are suggested for bulb and corm crops, in and around greenhouses, for outdoor nurseries and for chrysanthemum plantings.

2582. EASTWOOD, T.
Pre-emergence and post-emergence weed control with gladioli cormels.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 267-79, bibl. 2.

Three separate experiments were conducted in 1950 on Long Island, New York. In the first trial, pre-emergence applications of PCP at 5 lb. per acre in oil or in oil and water and NaPCP at 20 lb. per acre gave good control of broad-leaved weeds for about 36 days and even suppressed grassy weeds. In the second test, pre- plus post-emergence applications of NaPCP at 10 lb. gave the best control of broad-leaved weeds, but had no effect on grasses. None of the treatments in these 2 tests damaged the gladioli cormels, and maleic hydrazide at 1 lb., while unsuitable for weed control, stimulated flower production. In the last trial 2,4-D, PMA and a mixture of the two were applied in many combinations and complex data on crop response to the materials and time of treatment are given. Control of broad-leaved weeds was good in all cases. A 2 in deep salt-hay mulch was also found suitable for post-emergence weed control.

2583. CARLSON, R. F.
Weed control in gladioli.
Amer. Nurserym., 1954, **99** (7): 10, 103-6, illus.

Recommendations are made for the application of Crag No. 1, dinitro compounds and 2,4-D for weed control in gladioli. The use of other promising herbicides such as TCA, chloro IPC and endothal is mentioned.

2584. Pridham, A. M. S.
Control of winter annual weeds in rows of woody nursery stock by directional spraying with contact herbicides in late fall.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 293-5, bibl. 2.

Pre-emergence formulations of dinitros and chloro IPC gave good weed control without seriously injuring ornamental nursery stock. Notes are also given on the effects of various herbicides applied directly to dormant forsythia and ligustrum twigs.

2585. Simmons, J. A., and DeFrance, J. A.
Studies with endothal for clover control in turf.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 251-3, bibl. 2.

Two formulations of endothal, F-4069 containing ammonium sulphate, and F-3003, were applied at various rates for white clover control in lawn turf on 21 July, 1952. F-3003 at 2 lb. per acre was the most effective treatment, but it caused severe, though only temporary, discoloration of the turf grasses. The different amounts of water, 25, 50 and 100 gal., used as carriers for the treatments, did not appear to influence either control or discoloration.

2586. Simmons, J. A., and DeFrance, J. A.
Chemicals for the control of crabgrass in putting-green turf.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 255-62, bibl. 3.

Of pre-weed-emergence treatments tested, repeated applications at 10-day intervals of $\frac{3}{4}$ oz. of PMAS (10% phenyl mercuric acetate) per 1,000 sq. ft. gave the most satisfactory control of crabgrass in putting-green turf. To control young crabgrass, the same material applied at 1 oz. per 1,000 sq. ft. at 7-day intervals was found satisfactory. Scutl (0·75% mercuric acetate impregnated in vermiculite), also effective for both pre- and post-emergence treatments of crabgrass under certain conditions, caused turf discoloration.

2587. Bannerman, L. W., Engel, R. E., and Aldrich, R. J.
Potassium cyanate dust for the control of crabgrass.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 247-50, bibl. 1.

A 5% potassium cyanate dust applied to turf at 16 lb. per acre gave satisfactory crabgrass control but caused slight injury to the turf grasses. The addition of wetting agents increased the effectiveness of the 5% dust in some tests [see also *H.A.*, 23: 618]. Potassium cyanate as a spray was more toxic to the turf than as a dust. Phenyl mercury acetate used in one test gave no crabgrass control.

2588. Waywell, C. G.
A summary of four years' results on crabgrass control in Ontario.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 263-6.

In trials at the Ontario Agricultural College, potassium cyanate sprays at 0·64 to 1·4 oz. per sq. rod have given consistently good control of crabgrass over 4 years without permanently affecting the lawn grass (Kentucky bluegrass). Liquid applications of PMA were on the whole more satisfactory than dry ones.

2589. Escritt, J. R.
Efficient weed control in modern sports turf.
Proc. British Weed Control Conf. 1953, Margate, pp. 233-9.

In trials at the Sports Turf Research Institute, Bingley, 2,4-D and MCPA were about equally effective in controlling various turf weeds. Suitable rates and methods of application are discussed. Against weeds resistant to 2,4-D or MCPA, such as clover, endothal, sodium arsenite and 2,4,5-T have been tested with no outstanding success. Moss control with growth regulators was no more satisfactory and calcined sulphate of iron still appears to be the best specific. Maleic hydrazide applied for growth restriction was unsuitable for sports turf but showed promise on roadside verges and possibly on other similar areas where maintenance cost is important.

Weed control in fruit crops.

2590. Tubbs, F. R.
Some factors affecting the scope for the use of herbicides in fruit culture.
Proc. British Weed Control Conf. 1953, Margate, pp. 23-7.

The acreages of the more important kinds of fruit in England and Wales are given and the cost of mechanical weed control is discussed. While weed control is not regarded as a serious economic factor in tree fruit culture, and the effect of well-managed grass swards or of autumn weeds is favourable, the use of herbicides may provide definite advantages, including a reduction in the number of summer cultivations, limitation of sward growth and elimination of noxious weeds from both swards and cultivated orchards. A warning is given on the adverse effect unrestricted weed control in fruit-growing areas may have on pollinating insects. The use of herbicides in top and small fruits is very briefly reviewed.

2591. Carlson, R. F.
Control of winter annual weeds in apple rootstock with 3-CIPC.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 147-9, bibl. 1.

In Michigan, rows of a first-year stoolbed planting of M. I, VII, IX and XVI apple rootstocks were sprayed on 18 October, 1951, with 6, 12 and 18 lb. per acre of isopropyl N-(3-chlorophenyl) carbamate, and a plot already in production was similarly treated on 13 November, after the rooted shoots had been removed and the stools covered with an inch of soil. Satisfactory weed control was obtained throughout and the chemical had no injurious effect on the rootstocks at any of the concentrations used. Rooted cuttings harvested in early November of the following year appeared normal in vigour and number of roots formed compared with cuttings from untreated rows. No difference could be detected in tolerance to 3-CIPC between the various types of Malling rootstocks.

2592. Hitz, C. W., and Amling, H.
The use of certain herbicides in blueberry culture.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 143-5.

In a 1-year's test in Delaware, 2 applications of CMU at 1 and 2 lb. per acre provided adequate weed control for the season without showing any apparent toxicity to blueberries. For satisfactory weed control with dinitro sprays 5 applications were needed, and the sprays killed the new shoots originating from the crown of the blueberry plants, some of which normally serve as renewal stems at pruning.

2593. Isleib, D. R., and Aldrich, R. J.
The effect of sodium 2,4-dichlorophenoxyethyl sulfate on the growth and yield of strawberries.
Weeds, N. York, 1953, **2**: 262-70, bibl. 15, illus.

Yields of 7 strawberry varieties were not reduced by applications of sodium 2,4-dichlorophenoxyethyl sulphate in excess of amounts necessary for pre-emergence control of weeds. The material, however, temporarily retarded the growth of newly-set plants in the greenhouse and of runner production in the field. For best results applications should be timed so that the chemical is not in the soil during either early rooting of mother plants or maximum production of early runners. [See also *H.A.*, 23: 583.]

2594. Moore, R. C., and Chappell, W. E.
Herbicidal sprays in strawberries.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 159-61.

While Crag No. 1 appeared generally the best of the herbicides tested, none of the treatments seemed entirely satisfactory for weed control in strawberries.

2595. Hitz, C. W., Pak, K. H., and Rahn, E. M.
Use of a crop protectant with certain herbicides on strawberry plants.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 139-41, bibl. 3.

In both greenhouse and field tests in Delaware a 1% aqueous suspension of activated charcoal (Norite A or Nuchar) sprayed on strawberry plants prior to CMU and chloro IPC soil treatments, applied at 1 lb. per acre, gave partial protection against CMU toxicity and complete protection against chloro IPC. The charcoal spray also provided the soil around each plant with a protecting film but, when this was mechanically broken by hoeing, it had little residual effect against the herbicidal efficacy of CMU soil application.

2596. Rahn, E. M., and Hitz, C. W.
Chickweed control in strawberries by the use of DNs and IPC.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 135-8, bibl. 2.

A water-soluble dinitro, ammonium dinitro-secondary-butyl-phenate, applied at 1 lb. per acre in 100 gal. in January, after the strawberry plants had been hardened by frost, and again in March before growth commenced, was found to be the most desirable treatment from the point of view of weed, particularly chickweed, control, crop injury and yield.

2597. Freed, V. H.
Control of weedy grasses in the Pacific Northwest.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 83-7.

Apart from the older soil sterilants such as sodium chlorate and arsenicals, and petroleum hydrocarbons such as the aromatic oils, the carbamates IPC and chloro IPC and TCA and CMU are now used for the control of grass weeds. IPC and chloro IPC are particularly effective against annual grasses and, applied alone or in combination with oil at rates specified here, were found effective for weed control in strawberries, bulb crops, nursery crops, orchards and caneberries [raspberries, blackberries, etc.].

2598. Mirassou, E.
Use of 2,4-D to control morning glory in vineyards.
From abstr. in *Proc. 5th annu. Calif. Weed Conf. 1953*, San Jose, p. 11.

Low volatile 2,4-D at 1 pint in 33 gal. per acre gave good control of morning glory in vines, but in spite of careful application it produced abnormal growth and reduced the sugar content of the grapes. Very few vines died, however, and the production of the treated block was high.

Weed control in vegetables.

(*See also* 2621f, k.)

2599. Philp, J.
The weed problem in vegetable production.
Proc. British Weed Control Conf. 1953, Margate, pp. 18-23, bibl. 5.

Between 40 and 50 kinds of vegetable are grown in Britain, predominantly as annual crops, and usually only annual weed species are important in their production. The worst of these weeds are chickweed (*Stellaria media*), annual nettle (*Urtica urens*), fat hen (*Chenopodium album*) and annual meadow grass (*Poa annua*). In a perennial crop like asparagus, however, perennial weeds such as couch grass (*Agropyron repens*), bindweed (*Convolvulus arvensis*) and creeping thistle (*Cirsium arvense*) constitute the greatest problem. Weed competition is discussed. Chemical methods of weed control are restricted in this country; sulphuric acid is used in onions and leeks, mineral oils in carrots and parsnips and Dinoseb in drying peas and to lesser extent in canning peas.

2600. Sweet, R. D., and Ries, S. K.
Post emergence applications of five herbicides on ten vegetable crops.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 81-4.

In an attempt to find herbicides suitable for the majority of garden vegetables, crop tolerance rather than weed control was used as the principal criterion of performance. The responses of individual vegetables to applications of Crag 1, 6036 (bis (dichloro) phenoxyethyl oxalate), Sesin (2,4-dichlorophenoxy ethyl benzoate), and chloro IPC, each at 4 lb. per acre, and

CMU at ⅜ lb. per acre are given. Cabbage, carrots and beets were the most tolerant to all materials.

2601. Danielson, L. L., and France, V. A.
Experimental and field use of 3-chloro-IPC on vegetable crops in Tidewater, Virginia.
Proc. 7th annu. Mtg N.E. Weed .Control Conf. 1953, New York, pp. 73-9, bibl. 5.

Isopropyl N 3-chlorophenyl carbamate should be applied at 2 lb. per acre in 50 to 100 gal. between 1 May and 15 October and at 1 lb. per acre in 25 to 50 gal. between 15 October and 1 May, immediately after planting. Weeds controlled by the chemical are crab grass (*Digitaria* spp.), bull grass (*Eleusine indica*), purslane (*Portulaca oleracea*), chickweed (*Stellaria media*) and annual blue grass (*Poa* sp.). Spinach, kale, collards, broccoli, turnip greens, cabbage and beets for greens [spinach beet?] were found tolerant as were, in preliminary tests, snap beans, lima beans, soya beans, and tomato, pepper and beet-seedlings and strawberries. All the leaf crops which tolerated the 2 lb. application were somewhat retarded in early stages of growth but recovered soon enough to prevent yield losses. Climatic conditions were shown to affect crop tolerance; in cool weather it is suggested that the recommended 2 lb. rate for summer months should be reduced to 1 lb.

2602. LeCompte, S. B., Jr.
Asparagus fields treated with Crag Herbicide No. 1 in New Jersey, 1951, 1952.
From abstr. in *Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953*, New York, p. 109.

Crag No. 1 at 3½ to 3 lb. per acre in 100 gal., applied early in July at the end of the cutting season before any more asparagus shoots had emerged, gave commercial weed control in 2 tests to the end of August, and in one throughout the autumn. Similar applications made during the cutting season gave good weed control for 2 to 4 weeks. The asparagus from the treated areas is being examined for taste effects.

2603. LeCompte, S. B., Jr.
Weeding asparagus seedlings chemically, 1950-1952.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, p. 111.

Methods of applying Stoddard Solvent type oil to emerging asparagus seedlings are suggested. Granular calcium cyanamide and solutions of potassium cyanate were effective for pre-emergence and, under warm, dry conditions, also for post-emergence treatments.

2604. Noll, C. J., and Odland, M. L.
Pre-emergence weeding of asparagus seedlings.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 113-15.

In an experiment in Pennsylvania all 17 treatment plots had better weed control and produced heavier weights of asparagus roots than control plots. Dowicide G at 12 lb. per acre gave the most satisfactory results in weed control, stand of asparagus and weight of harvested roots. Other promising herbicides were Premerge at 4½ lb. and CMU at 1 lb. Stoddard Solvent was found very unsatisfactory.

2605. Dolan, D. D.
Pre-emergence treatments for weed control in asparagus—1952.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 117-19.

Premerge, Dowicide G, Santobrite, Polyborchlorate, CMU, chloro IPC, Oktone, Crag No. 1 and NPA were found very satisfactory for weed control in established asparagus in Rhode Island. Pre-emergence treatment with these materials, applied in early spring when the weed seeds were germinating, and with as little soil disturbance as possible, provided relative freedom from weeds for 6 to 8 weeks. Resistance of some weed species to particular chemicals and the ease of handling of the materials are also discussed.

2606. Detroux, L., de Faestraets, L., and de Laveleye, Y.
Essais de désherbage chimique des cultures d'asperges. **(Chemical weed control in asparagus.)**
Parasitica, 1954, **10**: 6-13, bibl. 1, illus.

In two years' tests of several herbicides for the control of weeds in asparagus the sodium salt of 2,4-D (2 kg. active agent per hectare) proved satisfactory. Petroleum derivatives had a rapid action, but occasionally required a second application to be fully effective. Best results were obtained with CMU, tested for only one year; further studies are needed to determine the residual action of the chemical in the crop plants. —Gembloux and Wesembeek-Ophem.

2607. Noll, C. J., Odland, M. L., and Fletcher, R. F.
Lima bean weed control.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 121-5.

Under dry conditions when weed infestations were limited, herbicidal treatments had no effect on bean yields, but when weeds were a serious problem pre-emergence application of Premerge and Dowicide G greatly increased yields. Plots treated with Premerge at 8 lb. per acre averaged more than ten times the yield of the untreated plots.

2608. Noll, C. J., and Odland, M. L.
Chemical weeding of beets.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 69-71.

Of materials tested in Pennsylvania, endothal applied pre-emergence at 6 lb. per acre gave the best weed control and its effectiveness was further increased when it was used in combination with TCA or CMU or both. Yields on the endothal-treated plots were slightly improved; the number of marketable beets was unaffected.

2609. Ries, S. K., and Sweet, R. D.
CMU, endothal and TCA on red beets.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 163-8, bibl. 4.

Red beets were tolerant of 2 to 6 lb. of endothal and 4 to 12 lb. of TCA applied either pre- or post-emergence. CMU at rates above ⅜ lb. and particularly when applied post-emergence was toxic. Beet response to CMU varied; generally, the higher the organic matter content of the soil the less was the damage. Responses of weed species to the herbicides are noted.

2610. RAHN. E. M.
Weed control in cantaloupes with PA in 1952.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 65-7, bibl. 2.

In Delaware, 2 lb. of a 90% w.p. of N-1 naphthyl phthalamic acid in 50 gal. per acre applied 5 days after seeding gave good control of certain broad-leaved weeds and crab grass without affecting the stand of cantaloupe plants. Total marketable yields and size of melons were not greatly influenced by the herbicide, but early yields, during the first 10 days of the harvest season, appeared to be somewhat reduced.

2611. RIES, S. K., AND SWEET, R. D.
Effect of time and method of application of Stoddard Solvent on celery.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 95-101, bibl. 3.

Stoddard Solvent at the rate of 75 gal. per acre was applied either over the row or directed onto the base of celery 2, 5 and 7 weeks after transplanting. Late treatments in general increased heart damage and reduced yields, but of the 2 methods of application the spray directed at the base of the plants caused less damage and much smaller yield reduction, and may afford a means of commercial weed control in celery.

2612. SWEET, R. D., AND RIES, S. K.
N-1 naphthyl phthalamic acid and Crag herbicide 1 on cucumbers, muskmelons, watermelons, and squash.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 57-63, bibl. 3.

In New York, N-1-naphthyl phthalamic acid (Alanap) at 4 lb. per acre, applied either pre- or post-crop-emergence but before weed emergence, gave good control of weeds in cucumbers, muskmelons, watermelons and winter squash without injuring the crop plants. Lower rates of the chemical and other materials used, including Crag No. 1, were either less effective or injured some of the crop plants.

2613. GAUSMAN, H. W., AND CORREA, R. T.
Pre-emergence investigations with Alanap-1 (N-1 naphthyl phthalamic acid) for weed control in cucurbits.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 34-6, bibl. 3.

Alanap-1 is a promising pre-emergence herbicide for the control of casual weeds (*Amaranthus* spp.) in plantings of cucumber, watermelon, and cantaloupe in the Lower Rio Grande Valley. At 4 lb. in 100 gal. of water per acre it gave almost perfect control of casual weeds for a period of 36 days after which the experiment was terminated. The 8 lb. rate caused some retardation in emergence of all cucurbits but not the 4 lb. rate. The Caserta variety of squash was extremely susceptible to both rates and recovery of growth did not occur. [From authors' summary.]

2614. DE ONG, E. R.
Lettuce injury from 2,4-D.
Plant Dis. Reptr, 1953, **37**: 410-11.

Three rinsings with water and alkali of spraying equipment used to apply 2,4-D esters were insufficient to prevent widespread damage to lettuce when the equipment was subsequently used to apply insecticides. The symptoms of 2,4-D injury are described.

2615. NOLL, C. J., AND ODLAND, M. L.
Chemical weeding of onions.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 91-3.

Pre-emergence application of 6 lb. per acre of endothal significantly reduced onion stands but gave good weed control and increased yield in comparison with the control. Pre-emergence application of 16 lb. of potassium cyanate followed by post-emergence treatment with the same material at 8 lb. gave almost as good weed control and the highest crop yield. A pre-emergence endothal and post-emergence potassium cyanate combination was also promising, but to minimize crop damage the materials should be applied at lower rates than the 6 and 8 lb. used in this experiment.

2616. PERKINS, D. Y.
A progress report on the use of stem sprays for onion weed control on muck soils.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 87-90, bibl. 1.

Herbicides showing promise for late-season weed control in onions were chloro-IPC, Crag 1, Sesin, F and B Weed Killers, endothal, phthalamic acid 1 and 5, and CMU. [See also *H.A.*, 21: 3553.]

2617. PROCTOR, J. M.
Weed control in peas.
Fmrs' Wkly, 1954, **40** (12): 71, 73, illus.

Hoeing is considered the most satisfactory and economic method for controlling weeds in peas, but, if for some reason it is not practicable, spraying with Dinoseb (DNBP) when the crop is 6 in. high may prove effective. Under certain conditions, particularly where charlock or mustard infestation is heavy, MCPA may be used (in marrowfat peas only) alone or in combination with Dinoseb.

2618. RIES, S. K., AND SWEET, R. D.
Post-emergence application of certain esters of 2,4-dichlorophenoxyethanol on tomatoes.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 103-7.

Crag 1, 6036 and Sesin mixed with 2 common fungicides were used in this experiment and the yields obtained indicated that Crag 1 was more toxic to tomatoes than 6036, and 6036 in turn more toxic than Sesin. Although there was no serious yield decrease from some of the treatments, all chemicals caused typical 2,4-D symptoms to appear on the foliage. The symptoms were most severe with Crag 1. Treating tomatoes twice with any of the materials caused more injury than a single application and there was also a tendency for a single early application to be more toxic than a single late application. The addition of fungicides did not appear to have affected the herbicides.

2619. LECOMPTE, S. B., Jr.
Effects of Crag Herbicide No. 1 on field tomatoes in New Jersey.
From abstr. in *Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953*, New York, p. 109.

Within about 2 weeks of applying Crag No. 1 at $3\frac{1}{2}$ lb. per acre in 100 gal., abnormal growth resembling mild 2,4-D symptoms and seedless fruits were observed on tomatoes.

2620. Baskin, A. D., and Walker, E. A.
The responses of tomato plants to vapors of 2,4-D and/or 2,4,5-T formulations at normal and higher temperatures.
Weeds, N. York, 1953, **2**: 280-7, bibl. 4, illus.

The amine formulations of 2,4-D appeared to be low-volatile at 90° to 120° F. Data obtained from 80 commercial ester formulations indicate that response of tomato plants to any given type of ester was essentially the same even when the amounts of the active acid present varied. The volatility of both volatile and low-volatile esters increased as temperature and duration of exposure were increased. The theory that 2,4,5-T esters are essentially lower in their volatility than comparable 2,4-D formulations has been confirmed.

Noted.

2621.

a Anderson, E. D.
New developments in sprayers for chemical weed control.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 321-7.

b George, D. K., and others.
Carbamate herbicides. Relative herbicidal and growth modifying activity of several esters of N-phenylcarbamic acid.
J. agric. Food Chem., 1954, **2**: 356-63, bibl. 22.

c Gifford, J. C.
The contractor's views of machinery available for spraying.
Proc. British Weed Control Conf. 1953, Margate, pp. 341-7.

d Kearns, H. G. H., and Morgan, N. G.
Trends in spray machinery for weed control.
Proc. British Weed Control Conf. 1953, Margate, pp. 334-41.

e Leonard, O. A.
High volume application of herbicides to sprouting and seedling chamise.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 43-53, bibl. 4.
Adenostoma fasciculatum control mainly with 2,4-D and 2,4,5-T.

f Miller, M. W.
Preliminary investigations with dinitro and MCP sprays for weed control in legume seeded peas.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 127-34, bibl. 7.

g Rai, G. S., and Hamner, C. L.
Persistence of sodium trichloroacetate in different soil types.
Weeds, N. York, 1953, **2**: 271-9, bibl. 22, illus.
Using wheat as test plant.

h Rämsch, H.
Die Unkrautbekämpfungsmittel UT 10, Hormit und Hedolit in ihrer bodenmikrobiologischen Wirkung. (**The action of the herbicides UT 10, Hormit and Hedolit on soil organisms.**)
Arch. Gartenb., 1953, **1**: 477-9.
In vitro tests on soil bacteria and fungi.

i Riepma, P.
Spuittechniek en weersomstandigheden. (**Spraying technique and weather conditions.**) [English summary $\frac{1}{3}$ p.]
Landbouwk. Tijdschr., 1954, **66**: 99-107, bibl. 6.
For weed control.

j Whitehead, S. S.
Weed control by burning.
Proc. 5th annu. Calif. Weed Conf. 1953, San Jose, pp. 62-3.
Along irrigation ditches and canals.

k Zimmerman, P. W., Hitchcock, A. E., and Kirkpatrick, H., Jr.
Methods for determining relative volatility of esters of 2,4-D and other growth regulants based on response of tomato plants.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 39-46, bibl. 9.
Weeds, N. York, 1953, **2**: 255-61, bibl. 9, illus.
For a more detailed report see *H.A.*, 23: 4132.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 2121, 2123, 2169, 2181, 2184, 2185, 2187, 2208a, b, 2219, 2396, 2397, 2418, 2443, 2542, 2838f, n, u, 2839b, 2909, 2924, 3105, 3291.)

2622. Anderssen, F. G.
Horticulture. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1953.]
Fmg S. Afr., 1954, **29**: 42-3, 56-7.

Production research: trials have been made at the Horticultural Research Station near Pretoria on the spacing of onions, growing out-of-season pickling onions, production of onions for a scarce period from sets, pruning tomatoes, tomato disease control and bean varieties. *Breeding research:* progress has been made with the improvement of Early Cape Flat onions, new dwarf bean varieties and strains including Wade, Rival and H.34/9, and rust-free snapdragons and with the breeding of flower varieties to suit South African conditions.

2623. British Columbia Vegetable Breeders' Committee.
Vegetable varieties: descriptions and uses.
Hort. Circ. B.C. Dep. Agric. **77**, 1953, pp. 51, illus.

Notes are given on size of product and time taken to mature as regards the main established varieties and some promising new varieties of 30 vegetables for commercial growing, processing and home gardening.

2624. Welch, J. E., and Smith, P. G.
Varieties suggested for commercial production in the United States.
Veg. Crops Ser. Univ. Calif. **61,** 1953, pp. 10.

Varieties of commercial vegetables suitable for growing in different areas of the United States are listed.

2625. Knott, J. E.
Varieties with resistance to diseases or insects.
Veg. Crops Ser., Univ. Calif. **60,** 1953, pp. 8.

A list is given for some 20 different vegetables of varieties resistant or tolerant to certain virus, bacterial and fungal diseases.

2626. Karner, L.
Ergebnisse der Gemüsesortenversuche des Jahres 1952. (**Results of vegetable variety trials in 1952.**)
Versuchsergebn. Bundesanst. alpine Landw. Admont, Hft **22,** 1953, pp. 26.

For a note on the object of these trials see *H.A.*, 20: 2716. In addition to the experimental plots at Admont, new alpine plots at varying altitudes have been established in Styria, Carinthia and at Salzburg.

2627. Blankholm, E., and Klougart, A.
34. Beretning fra Faellesudvalget for Prøvedyrkning af Køkkenurter. (**34th Report of the Committee for Testing Vegetables.**)
Årbog Gartneri 1953, 1954, **35**: 189-251, illus.

The results of variety trials with the following crops are reported in detail: early winter lettuce in glasshouses; cauliflower in unheated glasshouses and in cold frames; winter radish in glasshouses and spring radish in cold frames.

2628. Busch, W.
Betriebswirtschaftliche Folgerungen aus der Entwicklung des Preis- und Kostengefüges im Gemüsebau. (**Increased prices and production costs in vegetable growing and their effect on market gardening.**)
Gartenwelt, 1954, **54**: 65-7, bibl. 3.

The figures and graphs presented relate to the post-war period in Germany. The effect of vegetable imports on price development is also considered.—Tech. Hochschule, Hanover.

2629. Malavolta, E.
Estudos químico-agrícolas sôbre o enxofre. (**Chemical and agricultural studies on sulphur.**) [English summary 2 pp.]
An. Esc. sup. Agric. "Luiz de Queiroz" Piracicaba, 1952, **9**: 40-130, bibl. 192, illus.

This paper discusses sulphur in the soil and in plants. It reviews the literature on the subject and records the author's own experiments. The S, N and P percentages and the S/N and S/P ratios are given for a number of vegetable crops grown in the State of São Paulo. Laboratory studies of S deficiency in, and the utilization of organic S (cysteine) by, tomatoes are described.

2630. Rasmussen, C. L., and Shaw, W. L.
Preliminary planning for vegetable dehydration.
[*Publ.*] *U.S. Dep. Agric.* **AIC-356,** 1953, pp. 26, bibl. 66.

In this publication some of the problems are discussed which have to be faced by a newcomer considering entry into the vegetable dehydration industry. They include markets, technique, uniformity of raw material, location of plant, labour requirements, type of management, waste disposal, capital. In the United States in 1951 60% of the production of the vegetable dehydration industry consisted of potato products. The remainder was made up of 18% onions and garlic, 16% peppers and 6% others.

2631. Strydom, E.
Two important factors in commercial vegetable production.
Fmg S. Afr., 1954, **29**: 160.

Variety and spacing trials have received priority in the recently initiated vegetable trials at the Horticultural Research Station near Pretoria. A table is given of optimum spacings for 12 kinds of vegetable.

2632. Harrison, B. J., and McLeish, J.
Abnormalities of stored seed.
Nature, 1954, **173**: 593-4, bibl. 3, illus.

Seed of several lettuce varieties and one onion variety was stored for 5 years (*a*) unsealed, (*b*) sealed in air, (*c*) sealed in CO_2, and its germination capacity was compared with that of 1-year-old seed. Chromosome breakage and mitotic activity in root cells were also studied. The results show that (*b*), and even more (*c*) storage counteracts the effects of ageing, and that with lettuce, in spite of varietal differences, chromosome abnormalities tend to decrease sharply at high germination values. With onion the incidence of breakage was low at all levels of germination. It is concluded that gaseous exchange plays a large part in the metabolic processes of the resting seed and that the occurrence of cytological abnormalities is the consequence rather than the cause of seed deterioration.—John Innes hort. Instn.

2633. Kummer, H.
Schädigung der Keimfähigkeit von Gemüsesamen beim Aufbewahren in Buntdrucktüten. (**Injury to vegetable seed stored in colour-printed seed packets.**)
Angew. Bot., 1953, **27**: 115-42, illus.

The germination of lettuce seed was found to be seriously affected by a volatile, toxic substance emanating from colour-printed seed packets.—Staatl. landw. Versuchs- u. Forschungsanst. Augustenburg.

2634. Ministry of Agriculture, London.
Seed testing for farmers.
Adv. Leafl. Minist. Agric. Lond. **247,** 1952, pp. 6.

Farmers in Britain may send seeds, including seeds of vegetable crops, to be tested at the Official Seed Testing Station, Cambridge, for a charge of 1s. per sample. This leaflet provides information on sampling, purity and germination.

2635. TEWFIK, S., AND SCOTT, L. E.
Vegetable storage: respiration of vegetables as affected by postharvest treatment.
J. agric. Food Chem., 1954, **2**: 415-17, bibl. 7.

The carbon dioxide production of tomatoes, lima beans, snap beans, sweet corn, peas and asparagus was measured over a 7-day storage period at temperatures of 32°, 38°, 44° and 72° F. CO_2 production increased rapidly with rise in temperature; the rate at 44° F. was approximately double that at 32° F. for sweet corn, peas and lima beans. The increase in this range for snap beans, asparagus and tomatoes was from 62% to 79%. Husking sweet corn or cutting snap beans had little effect on CO_2 production, while the shelling of peas and lima beans greatly increased respiration. Not only do the CO_2 production rates of vegetables vary widely, but the respiratory responses to temperature increase and to wounding or exposure during preparation for market may be entirely different for various vegetables. [Authors' abstract.]—Univ. Maryland.

2636. THORNE, G. N.
Absorption of nitrogen, phosphorus and potassium from nutrient sprays by leaves.
J. exp. Bot., 1954, **5**: 37-48, bibl. 15.

Nutrient solutions containing N, P and K were sprayed daily for several weeks on brussels sprouts, french beans and tomatoes growing in soil. Increase in nutrient content occurred at high and low levels of nutrient supply to the roots and was proportional to the concentration of spray and to the frequency of spraying. Nutrient uptake by the leaves influenced uptake by the roots.

2637. DREIBRODT, L.
Über den Verlauf des Wasserverbrauchs und den Wasserbedarf verschiedener Gemüsearten. (**Water consumption and water requirement of various vegetables.**)
Z. Acker- u. PflBau., 1953, **97**: 203-12, from abstr. in *Soils and Ferts*, 1954, **17**, No. 857.

Experimental data are reported on the relationship between the daily water consumption of beans, kohlrabi and tomatoes, and the average temperatures. The yields of vegetables in pots are given at various stages of growth and at different water regimes (60–100% of water capacity), and the importance of an appropriate water supply throughout the season is discussed.—Tech. Univ., Berlin-Charlottenburg.

2638. (LAMBETH, V. N.)
Irrigation multiplies vegetable yields in Missouri.
Market Grs' J., 1954, **83** (3): 8, 40, illus.

In 1952 weekly irrigation to bring the previous week's rainfall to 1½ in. nearly doubled cucumber yields and increased snap bean yields 12-fold. In 1953 water was applied whenever the available moisture, measured by gypsum resistance blocks, dropped to 75%, 50% and 25% of field capacity. Marketable yields of Rutgers tomatoes were increased from about 3 tons per acre on unirrigated plots to 14 tons per acre on plots irrigated when available soil moisture dropped to 75%. The 50% and 25% treatments produced 12 and 11 tons per acre respectively.

2639. KOHLER, K. O.
Contour-furrow irrigation.
Leafl. U.S. Dep. Agric. Soil Cons. Serv. **342**, 1953, pp. 8, illus.

Contour-furrow irrigation of vegetable and fruit tree crops: design and layout, maintenance, advantages and disadvantages.

2640. IWATA, M., AND TANIUCHI, T.
Influence of the forms of nitrogen supplied on the growth of vegetable crops. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1953, **22**: 183-92, bibl. 27, illus.

A study was made of growth, yield and leaf inorganic constituents in tomato, kidney bean, turnip, spinach, cabbage and onion in sand culture treated with 7 nutrient solutions with different proportions of ammonium and nitrate ranging from all-ammonium to all-nitrate but the same total nitrogen. High nitrate gave excellent growth but high ammonium caused stunting, its injurious effect showing earlier and developing more quickly in spring and autumn than in winter crops. All-nitrate generally caused pale green leaves: leaves became blue-green or darker green with increasing ammonium, but very high ammonium and all-ammonium caused leafburn, root injury, the development of anthocyanin pigments in cabbage, and uneven leathery leaf surfaces in turnip and bean. Higher ammonium gave higher total nitrogen and phosphorus in the leaf, except in onion, and lower calcium and magnesium.

2641. COUTAN, —., DAUPLE, —., AND NOVEL, —.
Le *Sesbania*—son utilisation au Maroc. (***Sesbania*—its uses in Morocco.**)
Terre maroc., 1954, **28**: 16-17, illus.

Notes are given on the use of *Sesbania aegyptiaca* as a windbreak in the form of a living hedge 3–4 m. high or a fence of cut branches in Moroccan market gardens. It has also been used with success as a windbreak and shade plant in a banana plantation.

2642. KEENER, P. D.
Watery brown rot of vegetables in Arizona.
Bull. Ariz. agric. Exp. Stat. **253,** 1954, pp. 10, illus.

In Arizona this disease, which is also called drop, and is caused by *Sclerotinia sclerotiorum*, attacks lettuce, cabbage, celery, carrot, broccoli and cauliflower. Infection can occur at any time during the life of the plant; in lettuce it mostly takes place through the soil by means of hyphae and sclerotia. Experiments in both mildly and severely infected soils indicate that the fungus can be satisfactorily controlled by a broadcast application of calcium cyanamide (20% N) at a rate of 800 to 1,000 lb. per acre, 24 to 30 days before planting. An interval of three days per 100 lb. of chemical is necessary between application and planting.

2643. HOLMAN, J. C. M.
Iodine.
Comm. Gr, 1954, No. 3033, p. 296, illus.

A short account is given of trials in which aqueous solutions of iodine were sprayed on to seedbeds at a dilution of 1/5,000 and on to vegetable and flower crops at intervals of 2 to 3 weeks at 1/20,000. Compared with untreated controls, lettuce so treated grew more rapidly and was free from damping-off, botrytis diseases and wireworm attack, while tomatoes also grew more rapidly and were free from damping-off, foot-rot and mosaic diseases. Antirrhinum and gladiolus plants similarly treated remained free from rust, and chrysanthemums free from mildew.—Chilean Iodine Educ. Bur.

2644. Davies, J. N., and Owen, O.
Soil sterilization. III. The effect of cultivation on ammonia and nitrate production in a glasshouse soil steam-sterilized *in situ.*
J. Sci. Food Agric., 1954, **5**: 146-53, bibl. 6.

After steam sterilization there appeared to be few nitrifying organisms present prior to manurial treatment. Flooding caused some leaching of nitrate but had little effect on soil ammonia or nitrifying capacity. The application of a fertilizer dressing, including stable manure, three months after steaming, resulted in increased ammonia-production, followed within a few weeks by increased nitrification. The planting of tomatoes after the manurial treatment markedly accelerated the onset of nitrification, probably owing to the presence of nitrifying organisms in the potting soil. Where the soil was left undisturbed, apart from periodical watering, nitrification was slow. [From authors' summary.]—Exp. Res. Stat., Cheshunt.

2645. Miles, H., and Miles, M.
Root eelworms.
New Biol., 1954, No. 16, pp. 10-17, bibl. 3, illus.

An account of the more important features in the anatomy, mode of action and effects of some of the root eelworms which attack potatoes, tomatoes and peas, and infest glasshouse soils, and of their control by cultural and chemical methods.

2646. Jacobson, H. G. M.
Substitutes for stable manure in commercial vegetable farming.
Bull. Conn. agric. Exp. Stat. **560,** 1952, pp. 10, illus.

Peat moss, commercial dried sheep and cow manure and ground tobacco stems were tested as manures for sweet corn, carrot and cabbage in trials in Connecticut over a period of 9 years. Except for tobacco stems on carrots all these substances gave better yields than fertilizer alone. Cow manure and peat moss were best showing the greatest increases in both yield and soil organic content.

2647. Minz, G., and Palti, J.
Nematode control by fumigation. [Hebrew.]
Hassadeh, 1954, **34**: 437-40.

Experiments on control of nematodes attacking roots of cucumbers and tomatoes are described. Treatments were (1) Calcium cyanamide at 400 and 800 kg. per acre, (2) Ethylene dibromide at 1·5 c.c. per hole=66 l. per acre and at twice this rate, (3) D-D at 2·5 and 5·0 c.c. per hole=110 and 220 l. per acre. Injections of liquids were made by hand and by machine. Treatment (3) at the higher concentration was the most successful, more than doubling the crop of cucumbers, followed by treatment (2). No difference was observed between the calcium cyanamide and control plots. The tomato yield was not estimated, but the amount of root rot was greatly reduced by the D-D at 5 c.c. and ethylene dibromide at 3 c.c. applications. H.C.R.

2648. Holdeman, Q. L., and Graham, T. W.
The effect of different plant species on the population trends of the sting nematode.
Plant Dis. Reptr, 1953, **37**: 497-500, bibl. 12.

Greenhouse studies on *Belonolaimus gracilis* showed that populations (1) could build up under various named field crops and grasses, and under tomato, bell pepper, cucumber, squash and strawberry; (2) were maintained or carried over on certain field and cover crops and hot pepper; and (3) were reduced by other crops including tobacco and watermelon. Field studies showed that soya bean and cowpea increased the severity of the trouble on the next crop, and that crab grass is largely responsible for maintaining an infestation.—S. Carolina agric. Exp. Stat. and U.S. Dep. Agric.

2649. Haeussler, G. J.
Chemical control of wireworms profitable on irrigated land.
Res. Achiev. Sheet U.S. Dep. Agric. **164** (E), 1952, pp. 2.

D-D and especially EDB applied to a depth of 9 in. are extremely effective for the control of wireworms and nematodes in vegetable crops on irrigated land in the western United States and their effects last for one season. DDT dust or spray disced or ploughed in is also extremely efficacious against wireworms but not nematodes. It should be applied several weeks before the crop is planted and remains effective for 4 years or more.

2650. Stone, M. W., Foley, F. B., and Bixby, D. H.
Effect of soil applications of insecticides on the growth and yield of vegetable crops.
Circ. U.S. Dep. Agric. **926,** 1953, pp. 19, bibl. 6, illus.

Studies to determine the effect of annual soil applications of toxaphene and chlordane at 20 lb., aldrin at 4 lb., and ethylene dibromide at 3 gal. per acre on vegetable crops were conducted for 3 years. The growth and yield of the following crops were not affected by any of these treatments: tomatoes, peppers, cabbage, cauliflower, spinach, lettuce, beets, peas, and the Ventura lima beans. Following the second or third application of toxaphene there was a trend towards lower yields of Fordhook lima beans, celery, and carrots. Chemical analyses of the soil indicated that approximately 45% of the toxaphene remained in the soil a year after the second application. No significant amounts of toxaphene were present in lima beans grown in soils treated with this insecticide. No residues of aldrin were found in either soils or lima beans after application of 4 lb. of aldrin per acre. A panel of experienced tasters in 1951 were unable to detect any off-flavour in green lima beans or in tomatoes grown in soils treated with aldrin, chlordane, and toxaphene. [From authors' summary.]

2651. Klostermeyer, E. C., and Rasmussen, W. B.
The effect of soil insecticide treatments on mite population and damage.
J. econ. Ent., 1953, **46**: 910-12, bibl. 1, illus.

In an experiment at Prosser, Washington, increased soil applications of DDT, BHC, lindane, aldrin and chlordane resulted in increased populations of *Tetranychus bimaculatus* on beans and potatoes. This was probably due to changes in plant nutrition and composition induced by the insecticides in the soil. The effects of certain treatments on crop growth were very pronounced and will be reported elsewhere.

2652. Bezzi, E. M.
Acción acaricida de distintas sustancias químicas. **(The acaricidal effect of some chemical substances.)**
Rev. Fac. Agron. Eva Perón, 1953, **29** (1): 123-6.

In tests on the control of *Tetranychus telarius* on tomato with dusts arathane and dinitro-6-cyclohexylphenol gave effective control but azobenzene was only satisfactory at fairly high concentrations. In spray tests arathane emulsion gave effective control, but chlorinated hydrocarbons were unsatisfactory.

2653. Fleming, W. E., and Maines, W. W.
Effect of chlorinated organic compounds on plants grown in treated soil.
[*Publ.*] *U.S. Dep. Agric. Bur. Ent. Plant Quar.* **E-872,** 1953, pp. 7, bibl. 1.

Pot tests with numerous species of vegetables and flowers indicate that certain sensitive crops may be injured by the chlorinated organic compounds when used at the dosages required to kill third-instar larvae of the Japanese beetle (*Popillia japonica*) in the soil. Hollyhock appears very sensitive to aldrin; spinach and tomatoes to dieldrin; cucumbers, dianthus and scabiosa to endrin; and eggplant, peppers and tomatoes to lindane. However, with the possible exception of lindane, these insecticides might be used at the recommended rates without causing serious damage to most of the crops tested. [From authors' conclusions.]

2654. U.S. Department of Agriculture.
The imported fire ant. How to control it.
Leafl. U.S. Dep. Agric. **350,** 1954, pp. 8, illus.

Solenopsis saevissima var. *richteri*, a destructive pest of vegetables and citrus trees in most south-eastern States, can be controlled by spraying or dusting the anthills or by spraying the entire soil surface in heavily infested areas with chlordane, dieldrin and aldrin.

2655. Wene, G. P.
Control of some lepidopterous larvae which attack vegetables.
Proc. 8th Annu. Rio Grande Valley hort. Inst., 1954, pp. 41-4, bibl. 1.

In 3 years' experiments under the auspices of Texas Agricultural Experiment Station the best control of certain vegetable pests was given by the insecticides shown: (1) *Plutella maculipennis* caterpillars on cabbage —0·5 lb. DDT or 0·25 lb. parathion, each in 5 gal. water per acre; (2) *Trichoplusia ni* caterpillars on cabbage—20% toxaphene dust; (3) *Prodenia ornithogalli* (armyworm) and (4) *Heliothis armigera* (corn earworm), both on peas—20% toxaphene dust or 10% DDT dust; (5) *Peridroma margaritosa* (cutworm)—1·5 lb. toxaphene in 5 gal. water per acre; 0·37 lb. heptachlor in 5 gal. was promising.

Artichoke, globe.

2656. Mercuri, S.
La coltura dei carciofi romaneschi. **(Globe artichoke culture in the Rome district.)**
Ital. agric., 1954, **91**: 189-96, illus.

Rome is the main centre of Italian globe artichoke culture. In the province of Rome alone in 1953, 300 ha. yielded more than 200,000 quintals. There are 2 "Roman" artichokes, the true Roman or Campagnano variety and the Castellammare variety. Campagnano produces larger artichokes, relatively late and more highly prized. Castellammare does not do well on sandy soil, is less resistant to cold and is difficult to propagate. Cultural notes are given.

Asparagus.

2657. Pasquier, H.
Le forçage de l'asperge blanche. **(Forcing white asparagus.)**
Rev. hort. Paris, 1954, **126**: 1021-3.

At Montreuil (Seine) asparagus was successfully forced in January by using electric cables in the soil. A temperature of 22° to 25° C. was maintained for 11½ hours each day, and the first bunch was cut 17 days after heating had started.

Brassicas.

(*See also* 2137, 2413, 2807, 2838c, i, o, z, 2839a, 3298.)

2658. Bundesanstalt für Qualitätsforschung, Geisenheim.
Frost und Ascorbinsäuregehalt. **(Frost and ascorbic acid content.)**
A.R. Bundesanst. Qualitätsforsch. pflanzl. Erzeugn. Geisenheim 1953/54, 1954, pp. 16-17.

The ascorbic acid and chlorophyll contents of brussels sprout plants harvested at the end of January after a hard frost had dropped by 60% and 40% respectively compared with that of plants harvested before the frost at the end of November.

2659. Anderson, W. S.
New research in vegetable crops, fruit, flowers.
Miss. Fm Res., 1953, **16** (8): 1, 3, 8.

This review of research carried out at the Agricultural Experiment Station, State College, Mississippi, includes a report on the control of vegetative and reproductive responses in cabbage. Chlorophenoxypropionic acid (CIPP) at 250 p.p.m. was found to inhibit seed stalk initiation in cabbage which had been sprayed while in cold storage. When CIPP was applied before or after cold treatment the number of seed stalks and seeds produced was increased by comparison with the control plants, although the time of seed stalk initiation was not affected.

2660. Bundesanstalt für Qualitätsforschung, Geisenheim.
Über die Beziehung zwischen Kopfgrösse und Wertstoffgehalt bei Rotkohl. **(On the relation between size of head and nutritional value in red cabbage.)**
A.R. Bundesanst. Qualitätsforch. pflanzl. Erzeugn. Geisenheim 1953/54, 1954, p. 17.

The vitamin C content in the smallest of 3 red cabbage size grades was double that in the largest grade.

2661. IWAMA, S., HAMASHIMA, N., AND MOTAI, M. **Ecological studies of vegetables in the regions of different altitudes. 6. Ecological behaviors of spring-sown cauliflower.** [Japanese, with English summary 13 lines.]
J. hort. Ass. Japan, 1953, **22**: 167-71, bibl. 5.

Experiments at 360 and 1,200 m. showed that early varieties are best for high altitudes, that flower buds differentiated when the mean temperature was below 17° C. and that curds matured when the mean temperature was 18–20° C. Good spring yields were obtainable from plants with 5 or more leaves put out when the minimum temperature was 5° C.; at 1,200 m. plants planted in late spring yielded in mid-summer.

2662. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM.
Wertstoffgehalte von Blumenkohl hervorragender Markt- und Geschmacksqualität. **(The composition of high quality cauliflowers.)**
A.R. Bundesanst. Qualitätsforsch. pflanzl. Erzeugn. Geisenheim 1953/54, 1954, p. 16.

Data are tabulated on the composition of cauliflower heads and leaves which are remarkable for their high essential-amino-acid-(EEA-) index, as well as for their high vitamin C content.

2663. CANITANO, D.
La peluria dei cavolfiori. **(Cauliflower "peluria".)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 33-45, bibl. 1, illus.

"Peluria" is a disorder of cauliflower curds due to a disturbance of physiological processes—probably retarded transpiration—caused by high temperature and relative humidity. The symptom is a whitish to yellowish-green felty down consisting of numerous close appendages of various lengths, sometimes associated with brush-like tufts especially seen at the edges of the individual sections of the curd. The histology of affected curds is described.

2664. BORDERS, H. I.
Preliminary report on fungicide tests for control of downy mildew of cabbage seedlings in south Georgia.
Plant Dis. Reptr, 1953, **37**: 363-4.

Downy mildew of cabbage, caused by *Peronospora parasitica*, was significantly reduced by 6 fungicides, but differences between the treatments, which included both dusts and sprays, were not significant.

2665. ENDRIGKEIT, A.
Zur vorbeugenden Bekämpfung der Kohlfliege (*Chortophila brassicae* Bché.) bei Topfpflanzen im Pflanztopf- und Anzuchtbeetbegiessungsverfahren. **(The prophylactic treatment of potted plants for the control of cabbage root fly.)**
Z. angew. Ent., 1953, **35**: 82-90, bibl. 11.

Two methods of treating cauliflower seedlings with contact insecticides were tested: (1) dusts mixed with the potting or pricking-out soil and (2) solutions applied to the potted seedlings before transplanting. Gamma-Streu-Nex and Gamma-Nexen were found to give adequate protection for several months applied at specified high concentrations by either method. Other insecticides tested failed to protect the plants for a sufficiently long period.

Celery.

2666. KENDRICK, J. B., JR., AND OTHERS.
Some factors affecting development and control of adaxial crack stem of celery.
Phytopathology, 1954, **44**: 145-7, bibl. 13.

Adaxial crack stem of celery, due to boron deficiency, can be controlled by foliage sprays of 8 lb. borax per acre but not by soil application of borax. Very high nitrogen applications (900 lb. per acre) induce symptoms, but not moderate nitrogen (400 lb.) or high potassium (600 lb.).

Cucurbits.

(*See also* 2149, 2182, 2838d, e, v, y.)

2667. ITO, H., AND KATO, T.
Factors responsible for the sex expression of Japanese cucumber. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1953, **22**: 138-44, bibl. 9, illus.

Sex in Japanese cucumber varies with variety, with age and with light, temperature and fertilizer treatment.

2668. KOŠČEEV, A. K.
Large fruited Siberian cucumbers. [Russian.]
Sad i Ogorod, 1954, No. 2, p. 36.

A brief note about some very large good-quality white and pale green cucumbers developed in Siberia and now also grown in the Urals. The white cucumbers weigh about 1,500 g. and when kept for seed up to 1,970 g. In 1952 the pale green ones yielded 750 kg. per 50 sq. m.

2669. CEHMISTRENKO, V. F., USIK, G. E., AND NOVIKOV, N. M.
Group spacing of cucumbers, tomatoes and vegetable marrows. [Russian.]
Sad i Ogorod, 1954, No. 2, pp. 18-21.

Notes are given on methods of spacing cucumbers in groups of 7–8 at a distance of 1·5 × 1·5 m., tomatoes in groups of 2 at 80 × 80 cm. and vegetable marrows in groups of 4 at 1 × 1 m. The advantages claimed for this type of spacing are easier mechanical cultivation and increased and earlier yields.

2670. LEROUX, E. J.
Effects of various levels of nitrogen, phosphorus, and potassium in nutrient solution, on the fecundity of the two-spotted spider mite, *Tetranychus bimaculatus* Harvey (Acarina: Tetranychidae) reared on cucumber.
Canad. J. agric. Sci., 1954, **34**: 145-51, bibl. 21.

Mite populations rose with increased nutrients, especially N and K.

2671. PETERSEN, V. J., NIELSEN, H., AND PETERSEN, A. W.
Forsøg med topdressing af agurker. **(Top dressing trials with cucumber.)**
Årbog Gartneri 1953, 1954, **35**: 127-39.

Two applications of 3·33 kg. calcium nitrate per 100 sq. m. were compared with organic manures of an equivalent nitrogen content. The former was found to favour earliness, while the latter produced the highest total yields of cucumber. A suitable combination of the two types of manure might be the answer.

2672. NACENTOV, D. I., AND VAŠČENKO, S. F.
To increase cucumber yields. [Russian.]
Sad i Ogorod, 1954, No. 2, pp. 24-8, illus.

On the basis of experiments described it is recommended that in the central and northern zones of Russia cucumbers for frame cultivation should be raised in soil blocks at 20–25° C. day and 15–18° C. night temperatures, 85–95% humidity and 10 hours daylight. Outdoor cucumbers should be raised from seed treated by pre-germination at 18–20° C. day and 0–2° C. night temperatures for 10 days before sowing, and then grown in soil blocks at 17–19° C. day and 12–14° C. night temperatures, 70–80% humidity and 12 hours daylight.

2673. HOLMES, A. D.
Germination of seeds removed from mature and immature butternut squashes after seven months of storage.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 433-6, bibl. 4.

After 211 days storage the seeds from mature butternut squashes, *Cucurbita moschata*, were heavier and more viable than those from immature fruits, but the latter were considered to be of sufficiently good quality to be used for crop production.

2674. WILLIAMS, W. T., AND SHARMA, P. C.
The function of urease in *Citrullus* seeds.
J. exp. Bot., 1954, **5**: 136-57, bibl. 36.

A considerable amount of urease is found in the cotyledons of *Citrullus*, but little in other parts of the plant. Changes in urease activity during growth are related to cell extension and associated changes in water content and respiration.

2675. PASZEWSKI, A., FILIPEK, H., AND GULIŃSKA, M.
Badania wstepnę nad obrączkowaniem Dyniowatych. (**Preliminary studies on ringing cucurbits.**) [English and Russian summaries 1 p. each.]
Ann. Univ. Mariae Curie-Skłodowska, Sect. E, 1952, **7**: 1-12, bibl. 4.

Field experiments were conducted on ringing the cucumber variety Borszczachowskie by one of the two methods used earlier on tomatoes [see *H.A.*, 23: 818], namely the fixing of metal bands on the stems below the first leaf. The responses obtained, mostly favourable, depended on the date of ringing. When the treatment was applied at the time the first fruits were 3 cm. long, yields were increased by 38·0–57·6%.

2676. GAUSMAN, H. W., AND CORREA, R. T.
Response in yield of squash to different levels of nitrogen and phosphoric acid.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 64-6.

As part of a study of the nutritional requirements of cucurbits for optimum production in the Lower Rio Grande Valley a variety of squash was supplied with all possible combinations of 4 levels of nitrogen and 3 of phosphoric acid. It was highly responsive to phosphoric acid and gave the highest yield with the intermediate level (80 lb.). The addition of nitrogen with phosphoric acid depressed yields.

2677. TKAČENKO, F. A.
Intervarietal cross-pollination of watermelon. [Russian.]
Agrobiologija, 1953, No. 1, pp. 106-9.

Water melon variety combinations are named which produce hybrids of improved yield, quality, earliness and disease resistance suitable for the Ukraine. The best method of obtaining hybrid seed was planting the parent varieties in alternate rows and removing the male flowers of the mother plants.

2678. COURAUD, J.
Traitement comparatif de différents soufres sur le blanc du melon (*Erysiphe polygoni* D.C.). (**Comparative trials of different sulphurs against mildew (*Erysiphe polygoni*) of melon.**)
Terre maroc., 1954, **28**: 91-3.

Sublimated and micronized sulphur were the best of four compared, giving 12–20% infected leaves compared with 43–55% in the controls.

Legumes.

(*See also* 2138, 2140, 2145, 2146, 2147, 2152, 2153, 2155, 2167, 2176, 2178, 2524, 2838k, x, 2839d.)

2679. NICOLAISEN, N.
Unsere Gemüse-Hochzuchten. (**German vegetable varieties of high performance.**)
Saatgut-Wirtsch., 1954, **6**: 34-5, 64.

Descriptions are given of pea and bean varieties of high performance recently bred or selected in Germany and approved by a Government testing station after at least 3 years' trials.

2680. ALLARD, R. W.
New heat tolerant lima bean.
Calif. Agric., 1954, **8** (3): 5.

The Mackie lima bean is a bush type combining large seed size and heat tolerance.

2681. PICARD, J., AND FÉLIX, L.
La culture de la féverole dans la région parisienne. Résultats d'essais réalisés en 1952 et 1953. (**Broad bean growing in the Paris district. Results of experiments made in 1952 and 1953.**)
C.R. Acad. Agric. Fr., 1954, **40**: 123-9.

Two years' experimentation with 7 broad bean varieties demonstrated the superiority of early, large-seeded varieties. The best sowing density is about 40 plants per sq. m. in lines 0·3 m. apart.

2682. DACOSTA, G. C.
Factors causing varietal differences in germination of the common bean (*Phaseolus vulgaris*).
Diss. Abstr., 1954, **14**: 1-2, being *Publ.* 6564 of 84 pp.

White beans give poorer germination than black or coloured varieties, but no antibiotic substance in black beans nor any possible inhibiting substances in white beans were found to explain this phenomenon. Artificial inoculation of bean seeds with bacteria showed that contamination was limited to white varieties.

2683. Hibberd, N. V.
Abnormal developments in germinating French bean seed.
Qd agric. J., 1954, **78**: 33-6, illus.

Abnormalities in young bean seedlings are caused, to a large extent, by mechanical damage to the seed during threshing, cleaning or storage. The amount of damage caused can be seen by examination of seed-coats.

2684. Spina, P.
Osservazioni sulla biologia fiorale del pisello. (**Studies on the floral biology of the pea.**) [English summary 3 lines.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 20-31, bibl. 40, illus.

Studies were made at Florence and Catania to find means of ensuring greater purity in pea seed. Notes are given on the effect of environmental factors on vegetative vigour, flowering and fruiting, the mechanism of flowering and fertilization, and compatibility between different species and varieties.—Ist. Colt. arb. Univ. Firenze.

2685. Hänsel, H.
Vergleich der Konstanz verschiedener "Blühzeit"=Masse im Langtag in Hinblick auf Sortencharakteristik und Erbversuch bei *Pisum sativum.* (**On the constancy of different methods of measuring the "germination to flowering" period in peas under long-day conditions, with special reference to the characterization of varieties and to genetical trials.**)
Züchter, 1954, **24**: 77-92, bibl. 27.

A standard measure has been sought for the vegetative growth phase to flowering (Blühzeit) in peas. The methods tested are described. The possibility of breeding pea varieties that are late-flowering and photoperiodically neutral at the same time seems unlikely. The experiments were carried out with 3 varieties at Wageningen, Cambridge and Vienna.

2686. Watanabe, H.
Studies on the unfruitfulness of beans. 3. Influences of temperature on blooming, and of temperature and relative humidity on the pollen activity of beans. [Japanese, with English summary 6 lines.]
J. hort. Ass. Japan, 1953, **22**: 172-6, bibl. 19.

Beans flower naturally from midnight to sunrise. Day and night temperatures affect flowering, set being decreased by high evening temperature. Pollen activity is highest at anthesis and 10 hours before it. Pollen germination and pollen tube growth are favoured by damp conditions and moderate temperature, the optima being 94–100% R.H. and 20–25° C.

2687. Burton, J. C., Allen, O. N., and Berger, K. C.
Response of beans (*Phaseolus vulgaris* L.) to inoculation with mixtures of effective and ineffective rhizobia.
Proc. Soil Sci. Soc. Amer., 1954, **18**: 156-9, bibl. 11, illus.

Beans growing in sand in pots were injected with strains of beneficial and valueless rhizobia which naturally occur in the soil. Beans receiving both strains at planting made as good growth and fixed as much N as those receiving only the beneficial strains at planting or 21 days later. Plants bearing valueless nodules and nodule-free plants of the same age were equally susceptible to nodulation by beneficial rhizobia added at the 21-day stage. Valueless rhizobia added to 21-day-old plants bearing beneficial nodules had no adverse effect on growth or on N content of these plants. The amount of N in the bean nodules examined was related to the kind of inoculum applied; beneficial nodules contained 6–8% N, valueless ones averaged 3–4% N and those from plants treated with mixed inocula 5–8% N.

2688. Howarth, G.
Sammenligning mellem aerters spiring i marken og i laboratoriet. (**A comparison of pea germination in the field and in the laboratory.**)
Tidsskr. Planteavl, 1954, **57**: 251-70.

New trials with field and garden peas confirmed earlier results that the germination percentage in the field is consistently lower than that in the laboratory, irrespective of testing methods used. A detailed account of the tests is given.—Danish Seed Testing Stat.

2689. Hoover, M. W., and Dennison, R. A.
The correlation of stages of maturity with certain physical measurements in the southern pea, *Vigna sinensis.*
Proc. Amer. Soc. hort. Sci., 1953, **62**: 391-6, bibl. 5.

Seed of California Blackeye No. 5 variety southern peas was planted on 3 different dates at 2-week intervals, and harvests from each planting were made at 6 stages of maturity at 2-day intervals. The percentage of moisture in the seed decreased with maturity whereas seed content and specific gravity of both blanched and unblanched peas increased and the refractive index increased with maturity in the last 3 stages. [From authors' summary.]

2690. Bullen, E. R., Dadd, C. V., and Cooke, G. W.
Fertiliser placement experiments on green peas.
Agriculture, Lond., 1954, **61**: 19-22, bibl. 2.

The results of 5 years' trials on green peas show that on soils where fertilizers increase yields the greatest responses were obtained by placing the fertilizer at the side and slightly below the seed. On the average, the extra cash return from placement for picked peas was about £11 per acre. [From authors' summary.]—Rothamsted exp. Stat.

2691. Marth, P. C., Preston, W. H., Jr., and Mitchell, J. W.
Growth-controlling effects of some quaternary ammonium compounds on various species of plants.
Bot. Gaz., 1953, **115**: 200-4, bibl. 2, illus.

Studies were made on the response of Black Valentine bean plants to Amo-1618. When applied to the soil, Amo-1618 was absorbed by the roots of seedlings and translocated to stems, leaves and seeds. It induced the plant to develop shorter internodes, thicker stems and darker green leaves and it delayed maturity. The effect of Amo-1618 applied at 10 or 100 lb. per acre persisted in the soil apparently undiminished for 3 years. At a rate of 1 lb. per acre the effect was less but was still apparent at the end of 3 years. The effect of Amo-1618 absorbed from the soil and translocated to the seeds was evident in the 2 succeeding generations, but there was no apparent effect in the fourth generation. Of the 43 other plant species tested the following were very responsive to soil applications or sprays: snap beans, lima bush beans, calliopsis, chrysanthemum, lettuce, sesame and sunflower.

2692. Rahn, E. M.
Drilling v. banding of fertilizer for lima beans.
Bull. Del. agric. Exp. Stat. **291,** 1951, pp. 8, bibl. 2 [received 1954].

The best yields of lima beans were obtained (1) when drilling fertilizer before planting was combined with banding at planting, and (2) when poultry manure was broadcast before ploughing, followed by banding at planting.

2693. Boawn, L. C., Viets, F. G., Jr., and Crawford, C. L.
Effect of phosphate fertilizers on zinc nutrition of field beans.
Soil Sci., 1954, **78**: 1-7, bibl. 21.

Pot and field experiments on beans, var. Red Mexican, showed that superphosphate had no effect on the uptake of either applied or soil Zn. In pots Zn-deficiency symptoms were not produced, nor was dry matter yield reduced when the P_2O_5 concentration in plant tissue was more than doubled. Although in one of two field experiments P_2O_5 reduced the dry bean yield, this was not interpreted as an effect of P_2O_5 on Zn nutrition.

2694. Viets, F. G., Jr., Boawn, L. C., and Crawford, C. L.
Zinc content of bean plants in relation to deficiency symptoms and yield.
Plant Physiol., 1954, **29**: 76-9, bibl. 7, illus.

Zn deficiency symptoms in Red Mexican beans are described. Analysis of plants with different levels of Zn supply showed that all vegetative parts had a wide range in Zn content; the youngest tissue showed the greatest range. Deficiency symptoms were associated with about 20 p.p.m. or less in mature leaves or total top. Plants fertilized with 11·6 lb. Zn per acre contained more Zn throughout than unfertilized plants. Cu, P, K, Mg and Ca concentrations were not significantly affected. Substantial increases in dry bean yields were obtained by fertilizing with zinc sulphate even though Zn deficiency symptoms were not apparent on unfertilized plants. [From authors' summary.]

2695. Garren, R., Remmert, L. F., and Lawrence, N. L.
Effect of 2,4-D on translocation and accumulation of food materials in the bean plant.
Bot. Gaz., 1953, **115**: 105-21, bibl. 15, illus.

When 2,4-D was applied to Black Valentine bean plants it resulted, in general, in retardation of carbohydrate and total dry matter accumulation in the aerial portions of the plant. Translocation of 2,4-D, its derivatives, or unknowns appeared to be closely associated with translocation of carbohydrates or their derivatives, and these were profoundly influenced by 2,4-D application. Dry matter, accumulated in the various plant organs, was largely accounted for by smaller amounts of carbohydrates available. Responses to 2,4-D were observed above and below the place of application and varied considerably, depending on the location of the area treated. In general, responses were less pronounced in mature than in younger plants.

2696. Klinkowski, M.
Alte und neue Möglichkeiten der Bekämpfung von Pflanzenkrankheiten und Pflanzenschädlingen. **(Old and new methods of disease and pest control.)** [Russian, English, French summaries.]
Kühn Arch., 1953, **67**: 33-49, bibl. 29.

The review includes a detailed reference to the author's recent experiments on the control of halo blight (*Pseudomonas medicaginis*) in dwarf bean by antibiotics. Of untreated seed 30% was healthy, 32% diseased and 38% did not germinate; the corresponding figures for seed soaked for 2 hours in crude penicillin being 75%, 0·3% and 24·7%. Soaking the seed in crude streptomycin gave even more favourable results.

2697. Mitchell, J. W., Zaumeyer, W. J., and Preston, W. H., Jr.
Absorption and translocation of streptomycin by bean plants and its effect on the halo and common blight organisms.
Phytopathology, 1954, **44**: 25-30, bibl. 2, illus.

Streptomycin was readily absorbed and translocated by bean plants. The juice from treated plants inhibited the development of *Xanthomonas phaseoli*, the common blight organism, in *in vitro* tests. The development of *Pseudomonas phaseolicola*, the halo blight organism, in bean plants and plant material was retarded or inhibited by absorbed streptomycin and by streptomycin applied externally.—Plant Ind. Stat., Beltsville, Md.

2698. Wallen, V. R., and Skolko, A. J.
The inactivation of antifungal antibiotics by chlorine.
Plant Dis. Reptr, 1953, **37**: 421-4, bibl. 8, illus.

Soaking pea seed in water for 18 hours and then drying for 1 week at room temperature resulted in a marked decrease in infection by *Ascochyta pisi* and a slight increase in germination as compared with unsoaked controls. When seed similarly soaked and dried was dipped for 15 minutes in a 2% chlorine solution germination was little affected, but *A. pisi* infection was as high as in the controls. When the seed was soaked and then dipped in chlorine before drying both germination and *A. pisi* infection were drastically reduced. This experiment and studies of fungus development in plate cultures show that during soaking pea seed produces certain conditions or substances which are fungistatic to *A. pisi* and that this fungistatic effect can be neutralized by chlorine. The fact that chlorine is known to be able to inactivate certain antifungal antibiotics supports the theory that similar antibiotics are produced during soaking of the seed.—Dep. Agric., Ottawa.

2699. Buxton, E. W., and Storey, I. F.
The occurrence of pea wilt in Britain.
Plant Path., 1954, **3**: 13-16, bibl. 10, illus.

Pea wilt, to which many of the popular pea varieties including Laxton's Superb, Onward and Meteor are reported to be susceptible, is caused by *Fusarium oxysporum*. No work on the control of this disease has been carried out in Britain, but crop rotation may be an important and simple measure. The breeding of resistant varieties is also likely to prove important. J.S.

2700. Sörgel, G., and Unger, K.
Über den Befallsverlauf von *Mycosphaerella pinodes* (Berk. et Blox.) Stone, *Ascochyta pinodella* Jones und *Ascochyta pisi* Lib. an Erbsen am natürlichen Standort. **(On the course of infection of *Mycosphaerella pinodes, Ascochyta pinodella* and *A. pisi* on peas in the field.)**
Züchter, 1954, **24**: 56-68, bibl. 25, illus.

The observations showed, among other things, that infection is primarily determined by temperature and that humidity is a factor of secondary importance, the respective optima being 20–24° C. and 95%. The damage caused by *M. pinodes* was found to be heavier than that caused by either of the two *Ascochyta* species.

2701. Baumann, G.
Untersuchungen zur Biologie von *Mycosphaerella pinodes* (Berk. et Blox.) Stone. **(Studies on the biology of *Mycosphaerella pinodes*.)** [English, Russian, French summaries.]
Kühn Arch., 1953, **67**: 305-83, bibl. 136, illus. [See also *NachrBl. dtsch. PflSchDienst, Berlin*, 1954, **8**: 69-75, bibl. 27, illus.]

A soil temperature of 6–8° C. was found to be most favourable for the infection of peas with foot rot, while the development of stem, leaf and pod blight, also caused by *Mycosphaerella pinodes*, was shown to depend largely on air humidity. Field peas were resistant to the fungus but all the garden pea varieties tested proved susceptible in various degrees. Seed disinfection with Ceresan did not achieve satisfactory control, whereas seed treatment with new hormone preparations of VEB Fahlberg-List suppressed the fungus and stimulated plant growth. In preliminary tests with crude penicillin antibiotics also appeared promising for control. The biology of *Mycosphaerella pinodes* is discussed in detail.—Martin-Luther-Univ., Halle-Wittenberg.

2702. Allard, R. W.
Sources of root-knot nematode resistance in lima beans.
Phytopathology, 1954, **44**: 1-4, bibl. 5.

A survey revealed a wide range of reaction to root-knot nematodes (*Meloidogyne incognita* var. *acrita*) among lima bean strains. Twelve highly resistant or immune strains were selected as promising sources of resistance. —Univ. Calif. Coll. Agric., Davis.

2703. Way, M. J., Smith, P. M., and Potter, C.
Studies on the bean aphid (*Aphis fabae* Scop.) and its control on field beans.
Ann. appl. Biol., 1954, **41**: 117-31, bibl. 12.

Field trials on chemical control of *Aphis fabae* attacking spring-sown field beans were carried out at Rothamsted during 1950/52. The insecticide sprays were applied once only, soon after the primary aphid migration into the bean crop had ceased. An 0·02% (w/v) parathion spray, the systemic insecticides Isopestox and Systox at 0·05% (w/v) active ingredient and nicotine at 0·1% (w/v) gave excellent control. Other substances were not so successful.

2704. Sherman, M., Tamashiro, M., and Fukunaga, E. T.
Controlling greenhouse white fly on beans.
Hawaii Fm Sci., 1954, **2** (4): 1, 6, illus.

Sprays of wettable powders of a number of chlorinated hydrocarbon and phosphoric ester insecticides and of dilan and EPN gave effective control of greenhouse white fly on beans in experiments at Kona Branch Station in 1952/53.

2705. Lathrop, F. H.
Bean weevil control.
Me Fm Res., 1953, **1** (2): 4-5.

In Maine, two non-poisonous materials have been shown to protect beans in storage from weevils (*Bruchus rufimanus*). For home use mixing 1 teaspoonful of ground black pepper with a quart of dry beans gave protection. Two diatomaceous dusts, Celite 209 and Dicalite 1G-3, gave very good control at ½ oz. per 100 lb.; their effect is primarily against the newly hatched larvae.

2706. Schopp, R., Brindley, T. A., and Hinman, F. G.
Field-plot comparisons of insecticides for control of the pea weevil.
J. econ. Ent., 1953, **46**: 860-3, bibl. 1.

In Idaho, none of the insecticidal dusts tested against pea weevil, *Bruchus pisorum*, appeared to be more effective than DDT. Those which were approximately as effective as 5% DDT were 5% aldrin, BHC containing 1% and 2% of the γ isomer, 5% chlordane, 5% dieldrin, 1% endrin, 5% methoxychlor, 1% parathion and 10% toxaphene. [From authors' summary.]

2707. Brett, C. H., and Brubaker, R. W.
Mexican bean beetle control with malathon compared with eight other materials.
J. econ. Ent., 1953, **46**: 912-13.

Malathon (5%) applied to snap beans as dust at 25–30 lb. per acre gave very good control of Mexican bean beetle, *Epilachna varivestis*, without affecting the flavour of the beans. It was superior to other materials tested at the same time.

2708. Martyn, E. J., and Hudson, N. M.
Control of the armyworm, *Persectania ewingii* (Westw.) in Tasmania.
Tasm. J. Agric., 1953, **24**: 330-9, bibl. 3, illus.

Serious damage was done to peas among other crops in 1952/53. In control experiments in cocksfoot and white clover DDT as a low-volume spray and as a dust gave good control.

2709. Wene, G. P.
Lesser cornstalk borer injury to blackeyed peas.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 55-8, bibl. 1.

Chlorinated hydrocarbon dusts failed to give control of *Elasmopalpus lignosellus* in cow peas when applied to the seed before sowing or in a band over the seed after sowing, or in bean crops when applied to newly emerged seedlings.

Mushrooms.

(*See also* 2838b, g, h.)

2710. (Centre de Recherches sur les Champignons, Institut Agronomique de Gembloux.)
Proceedings of the Second International Conference on Scientific Aspects of Mushroom Growing, 1953, issued as *Mushroom Science II*, 1954, pp. 183, illus.

This publication contains 35 papers on classification, biology, physiology, biochemistry, composting, cultural practices, research, and pest and disease control read at the conference at Gembloux in 1953. Papers in French have English summaries and vice versa. A German issue is to be published. [See separate abstracts of individual papers.]

2711. Heinemann, P.
État actuel de l'étude systématique du genre *Agaricus* Fries *sensu stricto* (*Psalliota*). **(Present state of knowledge on the classification of the genus *Agaricus*.)** [English summary ½ p.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 6-11, bibl. 8.

Despite the efforts of numerous mycologists our knowledge of the genus *Agaricus* remains inadequate. The characters used in identification are too small in number and too subject to variation. The systematic classification resulting from the works cited is satisfactory for the European species; a table is given. As an appendix, the author gives the nomenclature for the cultivated species. [From author's summary.]

2712. Kenneth, R., and Wahl, I.
Cultivation of wild forms of *Psalliota bispora* (Lge.) Schaeffer and Moeller in Israel.
Bull. Res. Coun. Israel, 1953, **3**: 255-6, bibl. 4, illus.

Psalliota bispora, a naturally-occurring fungus in Israel, was grown successfully under commercial conditions.

2713. Sigel, E. M., and Sinden, J. W.
Variations in cultures made from the strain of mushrooms used at the Butler County Mushroom Farm, Inc.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 65-8, bibl. 2.

After more than 10 years in culture there were indications of deterioration in productivity in the isolate used in making the basic culture from which the whole yield of the farm is produced.

2714. Stoller, B. B.
Principles and practice of mushroom culture.
Econ. Bot., 1954, **8**: 48-95, bibl. 219, illus.

Recent developments in the technique of *Agaricus campestris* cultivation are reviewed under spore germination, spawn making, cytological and genetical characteristics, physiology of mycelial growth, composition of composts and cropping experiments, methods of composting or preparing substrates, factors affecting development of sporophores, diseases of sporophore and mycelium, insect pests, submerged culture, cultivation of other edible fungi and nutritive value of mushrooms.

2715. Anon.
Mushrooms grown in four days like penicillin.
Grower, 1954, **41**: 601-2.

Workers at Syracuse University, New York, report that it is possible to grow the rare, much-prized mushroom, *Morchella hortensis*, easily and cheaply in water culture under constant motion. Attempts to grow this species in normal bed culture have failed. When the mushroom fibre is chopped into miscroscopic pieces, however, and placed in a special nutrient solution which is kept in constant motion by compressed air, mushrooms about the size of peas will be produced in 4 days.

2716. Hild, G.
Situation actuelle de la culture des champignons en Belgique. **(The present position of mushroom growing in Belgium.)** [English summary ¾ p.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 75-82.

Introduced by French experts about 1920, mushroom growing had reached an annual production of 600,000–700,000 kg. [roughly one-thirtieth of that of France] by 1948. The method chiefly used is the traditional French one. Mushrooms are grown in caves, which supply about 70% of the national production and are mainly in Limburg (cool caves at 6–12° C., intermediate at 10–14° C. and warm at 12–16° C.), in converted cellars sometimes with good heating and ventilating systems, and in specially-built cellars with efficient heating systems and often with air conditioning (in which the tray system is used). Horse manure is used almost exclusively and is becoming scarce and dear while the price of mushrooms falls.

2717. Rasmussen, C. R.
Comments on the Danish mushroom industry and Danish mushroom research.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 83-92.

Mushroom growing (brown mushrooms) began about 1920. It has expanded since the second World War and annual production is now about 1,000 tons. Growing takes place chiefly in greenhouses and converted buildings. Average yields are low, 1¼ lb. per sq. ft. of surface. Composting is by traditional methods, the use of peak-heating is in its infancy, and the tray system has not proved successful. Notes are given on cultural practices and disease and pest control. A Mushroom Research Station was opened at Copenhagen Agricultural College in 1952: current experiments include a comparison of tray and shelf culture, and the submerged culture of mycelium.

2718. Guiochon, P.
Rapport sur les aspects actuels de la culture des champignons de couche en France. **(Report on the present position of mushroom growing in France.)** [English summary ¾ p.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 69-75.

Mushroom growing is an important industry in France. By 1952 annual production had again reached the pre-war level of 20,000 tons; half is consumed fresh and half preserved. The chief producing centres are the Paris, Tours/Saumur and Bordeaux districts. Horse manure supplies are still plentiful. The new Versailles research station is studying the fermentation of manure and the composition of casing soil, generally calcareous material from the caves. Notes are given on cultural practices (in general traditional) and on disease and pest control. Yields average 5–7% of the weight of compost with traditional methods and 12–18% with the tray system.

2719. Delmas, J.
Orientation des recherches sur la culture du champignon de couche en France. Contribution à l'étude des fermentations du fumier et des transformations physico-chimiques concomitantes. **(Research on mushroom growing in France: contribution to the study of composting and the accompanying physico-chemical changes.)** [English summary ½ p.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 118-23, illus.

The first subjects of study of the mushroom experiment station at St.-Cyr founded by the French mushroom growers' federation [in 1951?], were manures and their enrichment with N, P and K, pasteurization, and the choice of casing soil. A new line of research concerns the study and control of composting. Research has also been carried out on the distribution and form of combination of sulphur in compost.—Stat. Exp. St.-Cyr.

2720. Solari, M.
Une réalisation française de culture en caisse. **(A French tray culture project.)** [English summary ½ p.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 102-8.

Notes are given on the results achieved with large-scale, long-term tray culture under the Three Zones System after conversion from traditional methods. Average yields (taken on more than one thousand cubic metres of fresh manure) were 31 kg. per cu. m. or 6·5 kg. per sq. m. of surface.

2721. Hullen, E.
Aperçu de la culture des champignons en Allemagne. **(Note on mushroom growing in Germany.)** [English summary 9 lines.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 82-3.

In Germany mushroom growing is generally practised by the traditional French method in ridge beds, and little progress has been made in the last 50 years, except in control of disease and in better composting. Experiments on synthetic compost have been in progress for two years; and trays are now coming into use. The German Federation, with a present membership of 70, was founded four years ago to protect the interests of growers. A research centre financed by eight members has recently been established. [Author's summary.]

2722. Paeschke, J.
Neue Erkenntnisse im Champignonanbau. **(Recent observations in mushroom culture.)**
Kühn Arch., 1953, **67**: 291-9, bibl. 5, illus.

In Eastern Germany a shortage of horse manure for mushroom culture is anticipated. Yields were higher from an artificial medium consisting of 40 kg. peat, 10 kg. straw, 70 g. sodium nitrate, 35 g. ammonium sulphate and 7 g. potassium phosphate, the mixture being watered with a 2% urea solution. The optimum moisture content of the medium, the preparation of which is described, was 67–69%. The addition of two specified nutrient solutions to horse manure also improved yields.—Inst. Obst- u. Gemüsebau, Martin-Luther Univ., Halle-Wittenberg.

2723. van den Muijzenberg, E. W. B.
Development of mushroom growing [in Holland].
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 109-12, bibl. 5.

Growing (mainly for export) and research in Holland have expanded since the war. Yields in specially designed buildings are 60–120 kg. per ton of manure and efforts are being made to double them. Synthetic manure is beginning to be used. Production costs and yields in Holland and England are compared.

2724. Borzini, G.
Situation actuelle et problèmes de la culture des champignons en Italie. **(Present position and problems of mushroom growing in Italy.)**
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 68-9.

Mushroom growing in Italy is not an important industry owing to the high cost of equipment and labour and the low price of mushrooms. The main system used is the classic French one. Yields are rather low, 4–6 kg. per sq. m. of bed surface.

2725. Spoelstra, P. A.
Air conditioning of mushroom houses.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 112-18, illus.

Notes are given on temperature, humidity, supply, velocity and distribution of air, building construction and insulation, heating and cooling. There are diagrammatic drawings of a suitable building and apparatus.—Inst. hort. Engng, Wageningen.

2726. Edwards, R. L., and Flegg, P. B.
Experiments with artificial mixtures for casing mushroom beds.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 143-9, bibl. 6.

Mixtures of various proportions of clay-loam subsoil, sand, peat and vermiculite were tested as casing soils. A direct relationship was found to exist between yield and pore space of the dry material. Peat-vermiculite and peat-sand have given promising results in large-scale commercial trials. [See also *H.A.*, 23: 4239.]

2727. Atkins, F. C.
Current problems of mushroom growing in Great Britain.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 92-5, bibl. 9.

These include the financing of research at Yaxley, falling prices and rising costs of materials and labour, and diseases and pests, especially truffle, *Dactylium*, bacterial pit and eelworm.

2728. Edwards, R. L.
Some cultural practices and their effects.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 96-102.

Experiments at Yaxley and elsewhere have shown that (1) casing too soon after spawning (say 4–5 days) causes a reduction in yield except in cases of rapid growth of mycelium; (2) watering can be delayed up to 25 days after casing without affecting the yield; (3) picking at button, cup and flat stage gave no difference in yield of flats in the early stages and a more uneven production of flats; (4) peak-heating with and without live steam reduced verdigris, increased brown plaster and cecidomyid damage and did not affect nematodes or white plaster. There is need for further research on the exact capabilities of peak-heating.

2729. Edwards, R. L.
Yaxley's programme.
Bull. Mushroom Grs' Ass., 1954, No. 53, pp. 152-3.

The present main subjects of study at Yaxley Research Station are bacterial pit, yellow mould and casing soil.

2730. Sinden, J. W., and Hauser, E.
The nature of the composting process and its relation to short composting.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 123-31, bibl. 7.

The short composting method is described and discussed in relation to the composting process.

2731. Rempe, H.
Some experiments with sawdust-composting [in Germany].
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 131-3, bibl. 2.

Promising German experiments with sawdust compost, mainly a mixture of coniferous with beech sawdust, are described. Sawdust compost is a little more expensive and is more difficult to make than horse manure compost. Unpasteurized, it gives an average yield of 12·5 kg. per sq. m. of surface.

2732. Yoder, J. B., and Sinden, J. W.
Synthetic compost in America.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 133-9, bibl. 8.

Synthetic compost is in use throughout the United States. It consists of ground corn cobs and hay in proportions ranging from 2: 1 to 1: 2 with the following chemicals added to each ton of mixture: 25 lb. potassium chloride, 30 lb. cyanamide (or urea or 25 lb. ammonium nitrate), 50 lb. gypsum, and 75 lb. dry brewers' grains (or 300 lb. chicken manure). The method of composting is outlined. Synthetic compost is cheaper than and gives yields (2·0–2·5 lb. per sq. ft.) equal to, or greater than, natural compost.

2733. de Kleermaeker, E.
Some experiments with various casing soils.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 139-42.

Experiments to determine the effect of particle size and lime content of the casing soil on mushroom yields showed that soil pH (best yields at pH 8·0–8·2) is an important factor as well as water-holding capacity and structure (fine clays unsuitable).—Inst. hort. Engng, Wageningen.

2734. Flegg, P. B.
Pore space and related properties of casing materials.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 149-61, bibl. 14, illus.

The pore space of casing soil has an important effect on mushroom yields. Finer soils compact more readily and give lower yields. In experiments heavy weekly waterings caused a more rapid breakdown of structure than lighter waterings twice weekly. Mycelium can prevent the breakdown of a casing soil with an initially good structure, improve poor structure, and increase stability. Data are given on the rate of production and concentration of carbon dioxide in compost; the laws governing the diffusion of gases explain the presence of high concentrations of carbon dioxide after watering and their progressive diminution as the casing soil dries out. Notes are also given on the amount of water necessary to produce uniform humidity in casing soils of different aggregate sizes.

2735. Edwards, R. L.
Peat casings. Some observations on their use and merits.
Bull. Mushroom Grs' Ass., 1954, No. 53, pp. 162-3.

Peat can be used alone or mixed with lump chalk, sand, ashes or vermiculite in various proportions. It must be neutralized with chalk or lime.

2736. Casimir, J., and Heinemann, P.
Contribution à l'étude du métabolisme azoté chez les champignons: nutrition du mycélium de *Agaricus hortensis* var. *alba* au moyen de différents acides aminés. **(Contribution to the study of nitrogen metabolism in fungi: nutrition of the mycelium of *Agaricus hortensis* var. *alba* with different amino-acids.)** [English summary ½ p.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 21-6, bibl. 5.

Experiments with some 20 amino-acids showed that *Agaricus hortensis* mycelium could use about three-quarters of them as a source of nitrogen. The yield of mycelium varied widely according to the amino-acid used, examples (related to asparagine 100) being alpha-alanine 98, serine 50, hystidine a trace. The amino-acid composition of the mycelial protein was found to be practically independent of the source of the nitrogen.—Inst. Agron. Gembloux.

2737. Bouillenne-Walrand, —., Engels, L., and Willam, A.
Teneur en substances de croissance du champignon de couche (*Agaricus hortensis* var. *alba*). **(Growth substances content of the mushroom, *Agaricus hortensis* var. *alba*.)** [English summary 7 lines.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 26-8, bibl. 5.

Free auxins were present at rates ranging from 1·8 to 10·5 γ per kg. according to age of and position in the mushroom.

2738. Heinemann, P., and Engels, L.
Toxicité des acides organiques sur le mycelium d'*Agaricus hortensis* et espèces voisines, en culture pure. (**Toxicity of organic acids to the mycelium of *Agaricus hortensis* and allied species in pure culture.**) [English summary 14 lines.]
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 49-51, bibl. 1.

Experiments showed that organic acids inhibit the growth of mycelium of *Agaricus hortensis*. It is suggested that composts in which abnormal fermentation has occurred may contain enough organic acid to inhibit growth. Toxicity is attributed to the carboxyl group. [From authors' summary.]

2739. Sinden, J. W., and Hauser, E.
Nature and control of three mildew diseases of mushrooms in America.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 177-81.

In addition to *Dactylium dendroides* 2 other mildew fungi have been observed in the United States, *Didymocladium ternatum* and *Trichoderma koningi*. Means of differentiating between these 3 fungi are described. Where the diseases are not endemic control is obtainable by protective dusting with zineb and individual treatment of infections with calcium hypochlorate. In experiments under conditions very favourable to mildew diseases zineb dusting thrice weekly caused the disappearance of *Dactylium* and a great reduction in *Didymocladium* attacks but *Trichoderma* remained a problem, though less widespread than before.

2740. Cairns, E. J.
Relationship of the environmental moisture conditions of the mushroom-spawn nematode, *Ditylenchus* sp., to its control by heat.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 161-4.

Ditylenchus sp. is very resistant to heat during anabiosis in curd masses. Resistance varies widely with relative humidity, being lowest in a humid atmosphere but higher than in the active state. For control the nematodes should be exposed to moisture before the application of heat.—U.S. Dep. Agric. [See also *H.A.*, 24: 474.]

2741. Cairns, E. J.
Effects of temperature upon pathogenicity of the mushroom-spawn nematode, *Ditylenchus* sp.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 164-7.

Experiments showed that an increase of temperature from 7° to 30° C. favours mycelium destruction by *Ditylenchus* sp., but no relationship between destruction and the number of nematodes present (greatest at 18° C.) was observed. Increased destruction at higher temperatures must rather be attributed to a secondary rapid bacterial action on mycelium weakened by nematode attack. [See also *H.A.*, 24: 474.]

2742. Kux, M., and Rempe, H.
Experience with nematodes in sawdust-compost.
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 175-7, bibl. 5.

In Germany, where culture in beds on the ground is the general practice, nematodes of the genera *Rhabditis*, *Diplogaster*, *Cephalobus* and *Aphelenchoides* (but only occasionally *Ditylenchus*) are present in almost all sawdust composts, spawned or unspawned. Bad composting practice and failure to disinfect favour free-living nematodes of the *Rhabditis* type which breed freely in normally humid compost. They do not attack the mycelium directly but cause a stoppage of growth after a fortnight or more by secreting toxins. Like the nematodes themselves the toxins are susceptible to heat, and heavily infested compost can be regenerated by peak-heating.

2743. Moreton, B. D.
Fighting the Worthing mushroom fly.
Grower, 1954, **41**: 547.

The phorid fly *Megaselia* (*Megaselia*) *plurispinosa* has become very troublesome this year in mushroom houses. Although known in Holland as a pest of cultivated fungi, it has not previously been identified from mushroom beds in this country. The species appears to attack only the mycelium. There is no conclusive evidence that infestations have recently become serious as a result of the flies acquiring resistance to DDT and BHC. The best control of the phorids has been obtained by mixing 5% BHC dust with the compost in filling trays or beds; rates of up to 10 lb. per ton are recommended. The possible use of other insecticides and deterrents is discussed.

New Zealand spinach.

2744. Anon.
Dormancy and some other problems in seed testing.
N.Z. J. Agric., 1954, **88**: 207-9, illus.

Included in this article on seed dormancy is a description of four methods for increasing germination of New Zealand spinach (*Tetragonia expansa*). The highest germination, 70%, was obtained when the seed was grown on fairly dry soil at alternating temperatures of 5° and 25° C.

Okra.

2745. Anderson, W. H., Carolus, R. L., and Watson, D. P.
The germination of okra seed as influenced by treatment with acetone and alcohol.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 427-32, bibl. 5, illus.

Soaking okra seed in 95% acetone for 30 minutes, either immediately, or up to 40 days before, planting, accelerated emergence by 2 or 3 days under favourable conditions for germination and improved germination percentage and evenness of emergence. A similar treatment with 95% ethyl alcohol produced almost equally good results.

2746. VENKATARAMANI, K. S.
Some observations on blossom biology and fruit formation in *Hibiscus esculentus.*
J. Madras Univ., Sect. B, 1953, **23**: 1-14, bibl. 16, illus.

Experiments on 6 varieties of *Hibiscus esculentus* showed that: (1) the flower takes 20–22 days to reach maximum size from bud initiation; (2) the anthers dehisce soon after the corolla opens and the stigma is receptive while the flower remains open; (3) cross-pollination is more usual than self-pollination under field conditions; (4) pollen grains remain viable for about 144 hours at 0° C. over $CaCl_2$, but lose viability in 24 hours at 30° C.; (5) in variety P.13 the fruit reaches maximum length 10 days after pollination; (6) fruit curling may be the result of uneven pollen deposition on the stigmatic lobes.

Onions and related crops.

(*See also* 2838q, r, t, w.)

2747. PARNJAKOV, V. L.
Group planting of onion sets. [Russian.]
Agrobiologija, 1953, No. 2, pp. 115-19.

Under conditions of full fertilization and adequate irrigation onion sets 1–2 cm. in diameter planted in groups of 9 produced higher yields and earlier-maturing crops than when planted in rows. Over a 3-year period production costs, planting material required per unit area and labour requirements were all lower for group- than for row-planting.

2748. ERNST, E.
Versuche zur Ermittlung der wirtschaftlichsten Aussaatstärke für die Anzucht von Steckzwiebeln. **(Experiments on economic sowing for raising onion sets.)**
Arch. Gartenb., 1953, **1**: 473-6.

The optimum seed rate for the raising of onion sets of the variety Dresdener Plattrunde was found to be 10–12 g./mf.—Inst. Gartenb., Dresden-Pillnitz.

2749. BRUDER, J.
A dughagyma-hőkezelés eredményei. **(Results of heat treatment of onion sets.)**
Kert. és. Szől., 1953, No. 2, pp. 15-16, from abstr. in *Hung. agric. Rev.*, 1953, **2** (2): 7.

At Makó, heat treatment of onion sets at 35–40° C. for 25–30 days controlled bolting even in the large-sized groups. In addition yields were increased and disease development suppressed. In 1952 no fusarium rot was observed in sets treated at 35–40° C.

2750. CHROBOCZEK, E., AND GABRYL, T.
Wpływ jesiennego i wiosennogo sadzenia wysadków cebuli na rozwój nasienników i plon nasienia. **(Influence of autumn and spring planting of onion mother bulbs on plant development and seed yield.)** [English and Russian summaries 1¼ pp. each.]
Roczn. Nauk Rol., Ser. A, 1953, **68** (1): 85-101, bibl. 19.

Trials were conducted in 1942/43 and 1948/49 on autumn and spring planting of mother bulbs of the Wolska onion variety. Autumn planting resulted in greater loss of plants, less vigorous growth and lower seed yields. Bulbs for spring planting should be stored at about 8° C., the most favourable temperature for seed stalk primordia initiation.

2751. WEYDAHL, E.
Forsøk med løk på Kvithamar. **(Onion storage trials at Kvithamar.)**
Gartneryrket, 1954, **44**: 172-4.

Data are tabulated on the response of onion (1952-53) and shallot (1949-53) varieties to different storage temperatures applied for varying periods from 1 November to 1 April.

2752. PETERSON, C. E., AND FOSKETT, R. L.
Occurrence of pollen sterility in seed fields of Scott County Globe onions.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 443-8, bibl. 5, illus.

Pollen sterility to the extent of 0·96% was found in seed fields of Scott County Globe onions. Preliminary studies indicated a similar mode of inheritance to that of male sterility in Italian Red 13-53.

2753. BERNSTEIN, L., AND AYERS, A. D.
Salt tolerance of five varieties of onions.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 367-70, bibl. 5.

The salt tolerance of onions grown as a spring crop at Riverside, California, is low, a 50% decrease in yield occurring at an EC_e value of 4·1 millimhos/cm. With the exception of Texas Early Grano, which was somewhat more salt-sensitive, the salt tolerance of 5 commercially important varieties grown on plots artificially made saline did not differ appreciably.

2754. PATERSON, D. R., AND WITTWER, S. H.
Further investigations on the use of maleic hydrazide as a sprout inhibitor for onions.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 405-10, bibl. 9, illus.

Studies to determine the optimum concentration and best time of application for different varieties. [For fundamental work see *H.A.*, 23: 4246 and earlier abstracts.]

2755. CRUICKSHANK, I. A. M., AND JACKS, H.
Seed disinfection. IX. Control of onion smut (*Urocystis cepulae* Frost).
N.Z. J. Sci. Tech., Sect. A, 1953, **35**: 390-3, bibl. 7.

In glasshouse tests, materials based on thiram gave better control of onion smut than calomel. In field trials, seed dressed with thiram compounds (at 50% by weight) reduced smut infections to approximately the same degree as Formalin-drip treatment of soil in drills. To secure satisfactory control with thiram-based compounds it was necessary to use materials containing not less than 50% active material, applied at 50% of seed weight. Seed treated with thiram gave significantly higher emergence than either untreated seed or that sown with Formalin-drip treatment. [Authors' summary.]

2756. VAN DOORN, A. M.
Bestrijding van valse meeldauw bij uien. **(Control of downy mildew on onions.)**
Tijdschr. PlZiekt., 1954, **60**: 77.

A copper preparation (Koneprox), a captan preparation (Flit-406) and a zineb preparation (Dithana Z 78) were compared for control of downy mildew of onions

(*Peronospora destructor*). The zineb preparation gave the best control and it is recommended that this should be used with a spreader-sticker (Grasselli 1: 4,000) as a mist spray at the rate of 3 kg./150 l./ha. Spraying should start as soon as the weather is suitable for the development of the fungus but before infection has occurred, and should be repeated at intervals of 7–10 days.

2757. van Doorn, A. M.
Het koprotonderzoek bij uien. **(Neck rot of onions.)**
Tijdschr. PlZiekt., 1954, **60**: 76-7.

Studies in Holland have shown that neck rot of onions, caused by *Botrytis allii*, probably infects the plants while they are spread out on the ground to dry after harvesting. Since infection becomes impossible once the neck is thoroughly dried, trials were carried out to determine the effectiveness of artificial drying as a control measure. Onions were either artificially dried at 40° C. directly after harvest or were left for 4, 8 or 15 days before artificial drying. Onions artificially dried immediately after harvest showed the same amount (14%) of neck rot infection as those dried naturally in the open. Leaving the onions for 4 and 8 days before drying reduced infection to 9% and 5% respectively. With further delay, however, the amount of infection rose again. It is concluded that artificial drying will reduce the amount of neck rot infection, provided the onions are left on the ground for 7–10 days after harvesting.

2758. Haeussler, G. J.
Control of onion thrips increases vegetable yields.
Res. Achiev. Sheet U.S. Dep. Agric. **163 (E)**, 1953, pp. 2.

A heavy infestation of onion thrips (*Thrips tabaci*) may reduce bulb onion production by 8,000 to 10,000 lb. per acre. Seed onion production may be reduced to 200 to 400 lb. per acre under heavy infestation, whereas, by using DDT dust, production can be raised to 1,200 to 1,500 lb. of seed per acre. Other materials for control of thrips are 2·5% aldrin, 10% chlordane, 25% dieldrin, 4% EPN, 3% heptachlor, 2% metacide, 2% parathion, and 20% toxaphene.

2759. Fjelddalen, J., and Daviknes, T. B.
En foreløpig orientering om resultatene av forsøk med nyere insektmidler mot løkflue (*Hylemyia antiqua*). **(Preliminary tests of synthetic insecticides for onion fly control.)**
Gartneryrket, 1954, **44**: 151-2.

In preliminary trials on onion fly control some of the synthetic insecticides tested showed promise when applied as seed disinfectants or for dipping onion sets. Further studies are necessary.

2760. Mezzetti, A.
Il marciume carbonaceo dei bulbi di aglio. **(Charcoal rot of garlic cloves.)**
Inf. fitopat., 1953, **3**: 58-60, illus.

Notes are given on the symptoms and cause of garlic charcoal rot (*Macrophomina phaseolina*). Control is by prevention of the introduction of the fungus, by seed disinfection, and by the prompt disinfection of the soil in primary infection centres with formalin or carbon bisulphide. In soil already infected satisfactory control is difficult and expensive, but the application of abundant phosphorus and potassium—but not nitrogen, especially organic—confers some protection.

2761. Müller, F. P.
Die Zwiebellaus, *Rhopalomyzus ascalonicus* (Doncaster), Vorkommen in Deutschland und Lebensweise. **(The shallot aphid, its incidence in Germany and its biology.)**
Z. angew. Ent., 1953, **35**: 187-96, bibl. 19.

In Eastern Germany the shallot aphid, *Rhopalomyzus* (*Myzus*) *ascalonicus*, has so far been found only in glasshouses, especially on chives.—Phytopath. Inst. Naumburg (Saale).

Root crops.

(*See also* 2148, 2175, 2838p)

2762. Banga, O.
Taproot-problems in the breeding of root vegetables.
Euphytica, 1954, **3**: 20-7, bibl. 5.

There is a close positive correlation between foliage weight and taproot thickness in garden beet. The factors affecting the changeable equilibrium between growth of the primary axis and of the taproot are discussed.

2763. Hewitt, E. J.
Metal interrelationships in plant nutrition. 2. The relation of metal toxicity, molybdenum and nitrogen source to chlorophyll and magnesium content of beet in sand culture.
J. exp. Bot., 1954, **5**: 110-18, bibl. 15.

Sugar beet and spinach beet were grown in sand culture with different sources of N or Fe, and different levels of Mo and heavy metals; chlorophyll and some Mg fractions were determined. Extra Mo accentuated chlorosis caused by excess Mn^{++}, Cr^{+++}, Zn^{++}, and Cu^{++} and decreased it in the presence of CrO_4^{--} with nitrate. Ammonium sulphate caused increased chlorosis of spinach beet with Mn^{++} and Zn^{++}. The existence of an acetone-soluble Mg fraction other than chlorophyll was shown. Excess Cu^{++} and Zn^{++} decreased total Mg; Mn^{++} did not. Mn^{++} and Zn^{++} reduced chlorophyll, increased the non-chlorophyll acetone-soluble Mg, but reduced other fractions. Fe^{++} increased total Mg content, and also increased the acetone-soluble fractions in the presence of Mn^{++} and Zn^{++}. Extra Mo decreased the acetone-soluble Mg fractions but did not affect total Mg content. [From author's summary.]

2764. Krickl, M.
Vordringliche Zuchtziele bei Karotten. **(Primary aims in carrot breeding.)**
Saatgut-Wirtsch., 1954, **6**: 61-4, illus.

Formulation of aims in carrot breeding is followed by a preliminary account of such work carried out at the Höhere Lehr- u. Versuchsanstalt für Gartenbau, Wien-Schönbrunn.

2765. Nicolaisen-Scupin, L.
Morphologische Feststellungen an einem Möhrensortiment. **(Morphological data on carrot varieties.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 62-70, bibl. 5.

The ratio of nutritionally valuable skin to woody core was found to vary considerably in the ten carrot varieties examined. With several varieties the colouring of both tissues lacked uniformity. The characters studied are an aid in the description of carrot varieties.

2766. HAGIYA, K.
On the forms of branching of carrot varieties at flowering time and their relation to seed producing technique. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **22**: 230-4, bibl. 13, illus.

A study of 12 typical carrot varieties showed that in general the Far Eastern varieties have an erect branching habit, and the inflorescences on the main stems are larger than those on the laterals, while the European varieties have a spreading habit, and the inflorescences on the main and lateral stems are equally large. To get best quality seed and to facilitate harvesting and selection Far Eastern varieties should be closely spaced, their laterals, which are in general slender, short, and few, should be pruned, and the seeds gathered from the inflorescences on the main stems, while European varieties should be wider spaced, their main stems pruned and the seed gathered from the laterals.

2767. REHM, S.
The keeping quality of carrots.
Fmg S. Afr., 1954, **29**: 141-3.

Several carrot varieties were tested. Factors influencing keeping quality are size, shape and structure of the root, and leaf size. Nantes and a Chantenay strain showed the highest keeping quality. Removal of the leaves after harvesting improved keeping quality; spraying the leaves 3 times a day with water also helped.

2768. VON ARX, J. A.
De waardplantenreeks van *Phomopsis dauci*. **(Host plants of *Phomopsis dauci*.)** [German summary 4 lines.]
Tijdschr. PlZiekt., 1954, **60**: 72-3, bibl. 3.

Infection trials showed that *Phomopsis dauci* is specific to carrots. The fungus attacks both wild and cultivated forms.

2769. WEBER, P. V. V., YOUNKIN, S. G., AND MERWARTH, F. L.
Fungicidal control of alternaria blight of carrots.
From abstr. in *Phytopathology*, 1954, **44**: 112.

Fungicide tests have shown increases in carrot yield of 7 to 8 tons per acre following treatment with manganese ethylene bisdithiocarbamate, and 5 to 6 tons with zineb. Treatment was given on first appearance of leafspot and was continued at 10-day intervals until about 2 weeks before harvest.

2770. v. HÖSSLIN, R.
Formliche Veränderungen an Rettichrüben unter dem Einfluss verschiedener Anbaumethoden. **(The effect of method of cultivation on the shape of black radish roots.)**
Angew. Bot., 1953, **27**: 106-14, illus.

Transplanted black radishes formed a better-shaped root and yielded a heavier crop than plants sown directly in the glasshouse or in frames. The optimum length of the hypocotyl at transplanting was found to be about 5 cm.—Weihenstephan.

2771. CHOUDHRI, R. S., AND BHATNAGAR, V. B.
Effect of maleic hydrazide on growth, bolting behaviour and keeping quality of Indian radish (*Raphanus sativus* L.).
Proc. Indian Acad. Sci. Sect. B, 1954, **39**: 1-16, bibl. 54, illus.

0·05, 0·1 and 0·2% maleic hydrazide solutions at 40 gal. per acre were applied to radish crops 6 weeks after sowing and before flowering. The main conclusions were: (1) the medium concentration increased both fresh and dry weight of roots; (2) in treated plants bolting was rare and greatly delayed; (3) radishes from plants treated with the medium concentration had a better flavour and kept longer.

2772. ROLAND, G.
Note préliminaire sur la lutte contre la jaunisse du navet. **(Preliminary note on the control of turnip yellows.)** [English summary 7 lines.]
Rev. Agric. Brux., 1954, **7**: 475-7, bibl. 2.

It was previously established that late sowings reduce the incidence of turnip yellows [*H.A.*, 23: 4270]. A description is now given of experiments to determine to what extent late sowing reduces yield in the Gembloux area where both turnip yellows and turnip mosaic virus are endemic. Fortnightly sowings from mid-July to early September showed a progressive fall in the incidence of the viruses and in the yield, the yield in early September being only a fifth of that in mid-July. It was concluded that the reduction in virus attacks did not compensate for the drop in yield.

Salad crops.

(*See also* 2166, 2173, 2182.)

2773. WELCH, J. E., AND OTHERS.
Better lettuce project makes gains.
Repr. from *Western Grower and Shipper*, Nov. 1953, pp. 4.

Breeding programmes are being carried out in California with some success to get lettuce varieties with improved horticultural qualities, which will also be resistant to the virus diseases of mosaic, big vein and spotted wilt, and the fungus disease downy mildew. Varietal reaction to tipburn is being studied; the variety E-4 shows resistance to lettuce root aphid, *Prociphilus betae*.

2774. WHITAKER, T. W., AND MCCOLLUM, G. D.
Shattering in lettuce—its inheritance and biological significance.
Bull. Torrey bot. Cl., 1954, **81**: 104-10, bibl. 8, illus.

The shattering character in lettuce is described and shown to be the expression of a single dominant gene. In general, it is found only in wild lettuce, *Lactuca serriola*. The recessive allele (non-shattering) is mostly restricted to cultivated varieties. Shattering is not linked with either achene colour or leaf lobing. [From authors' summary.]

2775. POLJAKOFF-MAYBER, A.
Further identification of the sugars present in lettuce seeds.
Bull. Res. Coun. Israel, 1953, **3**: 248, bibl. 4.

The presence of sucrose and glucose in lettuce seeds during germination was confirmed by paper chromatography.

2776. Evenari, M., and Neumann, G.
The germination of lettuce seeds. IV. The influence of relative humidity of the air on light effect and germination.
Palest. J. Bot. (*J*), 1953, **6**: 96-100, bibl. 9.

Lettuce seeds of the variety Grand Rapids were kept under room conditions and germinated at intervals over a period of eleven months. The day-to-day and month-to-month fluctuations of the germination percentage were considerable (lowest 7, highest 46%). Germination of dry seeds previously kept under different but constant conditions was influenced by illumination and relative humidity prevailing during storage. When kept in light at a relative humidity of 60 to 70%, dry seeds were photosensitive. Increasing humidity during storage of the dry seeds increased subsequent germination percentage. [Authors' summary.]

2777. Iwama, S., and Motai, M.
Ecological studies of vegetables in regions of different altitudes. 7. Ecological behaviour of lettuce in hot season. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **22**: 203-16, bibl. 12, illus.

A late- and an early-bolting variety were tested at different altitudes in 1951 and 1952. It was found that the late bolter could be grown at 800–900 m. even in midsummer, but that at lower altitudes sowing should be early or late so that heading takes place before or after the hot season. Flower bud differentiation occurred when the temperature sum above 5° C. reached 1,700° C. in the late and 1,500° C. in the early bolter. Bolting was accelerated by high temperatures and retarded by temperatures below 15° C. Flower bud differentiation and development were unaffected by photoperiod. Both lettuces were fairly insensitive to temperature and diseases until vigorous growth and head formation began about 75 days after germination; the optimum temperature thereafter was 18–21° C.

2778. Lambeth, V. N.
Variable potassium and magnesium saturation on growth and mineral composition of Bibb lettuce.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 357-62, bibl. 15.

Variable K and Mg saturation levels were established on a Lintonia fine sandy loam differentially fertilized with N to establish the proper N-K relationship and the optimum cationic saturation levels for Bibb lettuce under greenhouse culture on a low exchange capacity soil. A significant decrease in yield as N was increased from 100 to 200 lb. per acre and a linear response to K saturation from 2·7% to 8·1% of the exchange capacity indicated that N-K unbalance is a contributing factor to low lettuce yields. A highly significant linear response in yield, increased ash content and increased percentage of K in the ash with increasing K saturation of the soil suggested an optimum K saturation level above 8·1% of the exchange capacity. There was no significant response to increasing the Mg saturation above 6·8%. [From author's summary.]

2779. Cook, J. A.
Cooling of lettuce in a cold air blast.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 422-6, bibl. 2, illus.

A method is described of measuring temperature fall on cooling in the centres of lettuce heads using thermistors connected to a modified Wheatstone resistance bridge.

2780. Ciferri, F.
Effetto del paratione immesso nel suolo su piante di lattuga e sua persistenza. (**Effect on lettuce of soil application of parathion and its persistence.**)
Not. Mal. Piante, 1954, No. 26, pp. 15-18, bibl. 8.

In pot experiments parathion was applied to the soil at normal rates the day before planting young lettuces. After 20 days the residual content of the plants was 0·1 p.p.m., i.e. below the generally accepted limit.—Ist. Pat. veg., Univ. Milano.

Spinach.

2781. Iwama, S., and others.
Ecological studies on vegetables in regions of different altitudes. 8. Spinach summer crops, with special reference to their premature bolting. [Japanese, with English summary 13 lines.]
J. hort. Ass. Japan, 1954, **22**: 217-22, bibl. 14.

Two varieties were tested under different conditions of temperature and light. The optimum temperature for vegetative growth was 15–20° C. The flower stalk differentiated when the day-length sum after germination reached 450–500 hours, but the seed stalk did not then develop if the photoperiod was less than 12 hours. In Nagana (36° N.) the critical date after which summer-sown spinach does not develop seed stalks is therefore mid-August. In practice serious losses from seed stalk development do not occur in spinach sown after mid-July.

2782. Junges, W.
Jarowisation von Spinat (*Spinacia oleracea* L.) und ihre "Nachwirkung" auf die folgende Generation. (**Vernalization of spinach and its "after-effect" in the following generation.**)
Arch. Gartenb., 1954, **2**: 1-8, bibl. 3.

Although there is no practical need to shorten the life cycle of spinach, this plant was chosen as a typical representative of short-lived summer annuals whose response to vernalization had not previously been studied. With the spinach variety tested (Matador) the optimum treatment—exposure of the seed to 0 to +5° C. for five days—caused the plants to flower one week earlier and increased the seed yield 6·5 times. The latter effect is due to an increase both in the number of seeds produced and in seed weight. Plants raised from this heavier seed were found to give a higher yield of foliage than the controls.—Inst. f. Gartenbau, Dresden-Pillnitz.

2783. KNOPPIEN, P., SCHMIDT, G. J., AND VAN DER WAAL, M. A.
De bestrijding van wolf in spinazie (*Peronospora spinaciae* (Mont.) de Bij). **(The control of downy mildew of spinach.)** [English summary $\frac{1}{4}$ p.]
Meded. Dir. Tuinb., 1954, **17**: 228-32.

Experiments were carried out with zineb to control downy mildew of spinach. A 3% zineb spray applied 2 or 3 times at 1 l. per are ($\frac{1}{40}$ acre) gave the best results. The effect of zineb on the preserving qualities of spinach remains to be determined.

2784. KENDRICK, J. B., Jr., AND MIDDLETON, J. T.
Funnel-leaf of spinach induced by 2,4-D.
Bull. Torrey bot. Cl., 1954, **81**: 137-40, bibl. 5, illus.

Funnel-leaf is the fusion of petiole margins and part of the lamina of leaves to form a tube encasing the apical bud. This malformation was induced in the laboratory by sprays and vapours of 2,4-D.

Tomatoes, eggplants and capsicums

(*See also* 2134, 2146, 2153, 2177, 2188, 2205, 2208y, 2647, 2652, 2669, 2838a, j, l, m, w, 2870, 3317.)

2785. SUNDQVIST, S.
Rationellare tomatodling. Erfarenheter genom arbetsstudier. **(Time studies in tomato growing.)**
Sver. Handelsträdgårdsmäst. Förb. Jubileumsskr. 1953, from abstr. in *Gartenwelt*, 1954, **54**: 74-5.

Data are tabulated on the time needed for (1) several operations connected with planting tomato plants, (2) the transport of potted plants, (3) tying, (4) defoliation.

2786. REINHOLD, J., AND GOETSCH, W.
Eine spontane Abänderung an den Früchten eines Fruchtstandes der Tomatensorte "Vetomold". **(A spontaneous modification in the fruits of a truss of the tomato variety Vetomold.)**
Arch. Gartenb., 1953, **1**: 480-1, bibl. 2, illus.

All unripe fruits on the fourth truss of one Vetomold tomato plant had dark green spots on the light green ground colour.—Inst. Gemüsebau, Grossbeeren.

2787. BREŽNEV, D. D.
The question of inheritance of acquired characters in tomatoes. [Russian.]
Agrobiologija, 1953, No. 3, pp. 29-40, illus.

Observations made since 1945 on the same tomato varieties grown in widely different areas have shown that changes were caused in both plant and fruit characters by the different environmental conditions and that these modifications were heritable. The characters studied included plant vigour, hardiness, fruit size and composition, and some appeared to be more readily affected than others. There was also a difference in varietal response.

2788. ROLL-HANSEN, J., AND VIBSTAD, A.
Veksthustomater på Kvithamar 1952-1953. Forsøk med sorter, damping og behandling med magnesiumsulfat. **(Glasshouse tomatoes at Kvithamar 1952-1953. Trials with varieties, steam sterilization and magnesium sulphate treatment.)**
Gartneryrket, 1954, **44**: 187-92.

The Norwegian early, leaf-mould-resistant tomato variety Kvithamar proved very satisfactory in comparison with Potentate and another standard variety and superior to British varieties resistant to leaf mould. Magnesium deficiency, to which Kvithamar is subject, was successfully overcome by 5 foliage applications of magnesium sulphate. Steam sterilization of the soil increased yields considerably. Full data are tabulated.

2789. DINI, M.
Prove di orientamento su alcune varietà de pomodoro. **(Tomato varietal trials.)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 121-32, illus.

Earliness, fruiting characters and yield were compared in Marglobe and 4 named salad varieties. Size of plant, yield and specific gravity of fruit were compared in 4 named purée varieties, San Marzano Cascine, San Marzano Magelli 43, Lampadina and Vesuvio. Flowering date, plant size and fruit characters were compared in 29 named salad varieties; the best of the smooth, round, export varieties were Nunhem Export, Best of All, I.C.E., and Primaticcio di Albenga.

2790. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med forskellig planteafstand til tomatplanter i vaeksthus 1950-52. **(Spacing trials with glasshouse tomatoes, 1950-52.)**
Tidsskr. Planteavl, 1954, **57**: 362-4.

Results are tabulated of spacing trials with glasshouse tomatoes carried out for 3 years at the research stations Virum and Spangsbjerg. Highest early and total yields were obtained from the closest spacing, 50–30 cm. between the rows and 33·3 cm. in the row.

2791. ALPATJEV, A. V.
The productivity of tomatoes in relation to methods of seed growing. [Russian.]
Agrobiologija, 1953, No. 2, pp. 48-54, bibl. 6.

To obtain high tomato yields it is recommended that the seed should be derived from intervarietal crossing and the seed plants grown under conditions of high nutrition spaced in groups of 2 at 70 × 70 cm., 70 × 80 cm. or 80 × 80 cm.

2792. CRANE, F. L.
The synthesis of nicotinic acid in leaves of tomato, *Lycopersicum esculentum* Mill.
Diss. Abstr., 1953, **13**: 642, being *Publ.* 5658 of 95 pp.

An investigation was made of the factors affecting the biosynthesis of nicotinic acid in the leaves of mature tomato plants. Nicotinic acid was shown to be synthesized in the leaves by a light-activated system having no direct relation to photosynthesis. This system is a pathway of nicotinic acid synthesis in which tryptophan is not involved.

2793. SHAW, R. H.
Leaf and air temperatures under freezing conditions.
Plant Physiol., 1954, **29**: 102-4, bibl. 10.

Air temperatures in a standard instrument shelter at 135 cm. were found to be as much as 3° to 4·5° C. warmer than leaf temperatures of tomato plants when the conditions were favourable for strong upward radiation from the leaf. With almost a complete overcast this difference was reduced to 2° C. A leaf was about 1° C. colder than the air 1 cm. above the leaf. Certain leaves measured cooled to between −4° to −4·5° C. then showed a sudden rise of almost 2° C. This was believed to be due to the heat of fusion liberated when freezing occurred. Other leaves did not show this undercooling. [Author's summary.]

2794. ROMANOVIČ, E. A.
A new method of vegetative hybridization of plants. [Russian.]
Priroda, 1953, **42** (12): 103-4, bibl. 1, illus.

Juice of *Solanum nigrum* was injected daily into the internodes of stems of young small-fruited tomato plants for 4 weeks. During the year of application, apart from some minor changes in flower structure, the treated plants and their fruits did not differ from the controls. The following season, however, plants raised from seed of the injected tomatoes were more vigorous, had modified leaves and produced fruits which were 3–4 times heavier, but of lower vitamin C content, than those of the controls.

2795. BONTOVITS, L.
Paradicsomfajták szárazanyag-, cukor-, sav- és C-vitamintartalmának alakuláse az érés folyamán. **(Changes in dry matter, sugar, acid and vitamin C contents in tomato varieties during ripening.)**
Ann. Inst. invest. Hort., 1952, pp. 27-41, from abstr. in *Hung. agric. Rev.*, 1953, **2** (2): 8.

The composition of 3 tomato species and 8 varieties, trained to 3 stems and grown both staked and unstaked, was compared in Kecskemét. Weather conditions were shown to have a great effect on composition. Dry matter was highest at moderate temperature, light intensity and humidity and was influenced more by variety and manurial treatment than by method of cultivation. Sugar content was highest at high temperature, light intensity and humidity in unstaked plants. High temperature, high light intensity and low humidity reduced acidity, and temperature between 24° and 26° C., low humidity and absence of staking favoured vitamin C accumulation. Colour was also affected by temperature, light intensity, and humidity and to a limited extent by soil.

2796. LAWRENCE, W. J. C.
Temperature and tomato flowering.
A.R. John Innes hort. Instn 1953, 1954, p. 24.

Using the tomato variety Ailsa Craig, it was established that the temperature during the first few weeks of growth controls the number of flowers borne on the inflorescence, and the position on the stem at which the first inflorescence will develop. Increase in the number of leaves to the first inflorescence can offset the early flowering normally associated with high temperatures.

2797. BOUILLENNE, R., AND FOUARGE, M.
Comparaison de divers systèmes d'éclairage artificiel appliqués à la culture des tomates. **(A comparison of different methods of artificial illumination for tomato culture.)**
Bull. hort. Liège, 1954, **9**: 39-42, bibl. 4, illus.

Comparisons were made between light given to tomatoes by four "Phytor C.R.H. Lg." tubes and a mercury lamp Ho. 2.000. In the variety Joffre, growth and development were more rapid under the "Phytor C.R.H. Lg." despite lower consumption of current.

2798. BOUILLENNE, R., AND FOUARGE, M.
Quelques considérations sur l'application de la lumière froide dans la culture des tomates. **(Some considerations on the use of cold light in tomato culture.)**
Rev. hort. Paris, 1954, **126**: 1028-33, bibl. 12, illus.

At Liège a new type of fluorescent tube, the "Phytor C.R.H. Lg.", has been used on lettuce, cabbage and tomato crops. It gave the same effect on tomato var. Joffre as natural light under the best conditions. In comparative experiments with mercury vapour lamps used for tomato illumination at Wageningen, not only was the watt consumption and thus the cost of the "Phytor C.R.H. Lg." less, but the growth of the tomatoes was superior.

2799. MORRIS, L. G., POSTLETHWAITE, J. D., AND EDWARDS, R. I.
Ventilation and the supply of carbon dioxide to a glasshouse tomato crop.
Tech. Mem. nat. Inst. agric. Engng **87**, illus., from abstr. in *Agric. hort. Engng Abstr.*, 1954, **5**, No. 402.

At low ventilation rates carbon dioxide depletion in glasshouses may reduce the rate of growth, and the purpose of the investigations was, therefore, to estimate the ventilation rate needed to prevent a retardation of growth, and, in particular, to find the net rate of CO_2 assimilation during the growing season by the tops of tomato plants. For this purpose one plant from each of the 6 beds was cut off at the cotyledons in a random selection at fortnightly intervals; the plants were then dried and subjected to a carbon analysis. It is deduced from the results that about 10 air changes are required per hour to ensure an adequate CO_2 supply. This is likely to be well below the normal ventilation rate in glasshouses.

2800. WEGER, N.
Höhere Tomaten- und Gurkenerträge durch Abdecken des Bodens mit Glas. **(Higher yield of tomatoes and cucumbers from covering the intervening soil with glass.)**
Z. Acker- u. PflBau, 1953, **97**: 115-28, from abstr. in *Soils and Ferts*, 1954, **17**, No. 637.

Covering the soil between plant rows with glass panes at angles of 5° towards the middle of the beds greatly increased soil temperature at 5 cm. depth, air temperatures above the crops, and light reflexion even on days without direct sunlight. Moisture content of glass-protected soil was generally lower in the 0–10 cm. layer and about the same at greater depths as that of uncovered soil. The effects of soil covering were improved root development and considerably increased yields.—Dtsch. Wetterdienst, ForschStelle Geisenheim.

2801. Raphael, T. D., and Richards, R. R.
Tomatoes—(further work on fruit setting with hormone sprays).
Tasm. J. Agric., 1953, **24**: 374-7, bibl. 2, illus.

The limited number of varieties which can be successfully grown under normal outdoor conditions in Tasmania and the uncertain climatic conditions in spring make particularly desirable any method whereby the setting, especially that of early fruit, can be improved. In field trials in 1951/52 and 1952/53 beta-naphthoxyacetic acid and a number of commercial plant hormone preparations gave significant increases in fruit set.

2802. Learner, E. N.
Growth and development of *Lycopersicum esculentum* as affected by thermoperiod, photoperiod, chemical growth regulators and nutritional sprays.
Diss. Abstr., 1954, **14**: 214-15, being *Publ.* 6853 of 121 pp.

Details are given of experiments made in Michigan on several greenhouse tomato varieties to develop economic methods of improving yield and quality in winter and spring. An outline of the results is: (1) increased night temperatures gave increased stem growth and dry weight yield; (2) increased night temperatures plus light supplement gave increased total yield, increased yield of first quality fruit, earlier harvest and less green placental tissue in mature fruit; (3) nutritional sprays gave no advantages; (4) two growth substances applied to the soil reduced the number of fruits harvested while a third, 4-phthalimido-2,6-dimethyl pyrimidine, increased the weight of early harvested fruit.

2803. Bundesanstalt für Qualitätsforschung, Geisenheim.
Treten nach einer Anwendung von Wuchsstoffpräparaten Änderungen im Wertstoffgehalt von Tomaten (*Lycopersicum esculentum* Mill) ein? **(The effect of growth substance applications on the composition of tomatoes.)**
A.R. Bundesanst. Qualitätsforsch. pflanzl. Erzeugn. Geisenheim 1953/54, 1954, p. 18.

The application of a hormone preparation for improved fruit set had the effect of increasing the sugar and carotene content and of decreasing the total N and protein content in ripe tomato fruits. The determination of 10 amino acids showed that the fruit protein had lost considerably in nutritional value.

2804. Parsons, C. S., and Davis, E. W.
Hormone effect on tomatoes grown in nitrogen-rich soil.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 371-6, bibl. 14.

In greenhouse experiments various rates of N applied to tomatoes in 1 and 2 applications produced significantly greater yields than the control. Applying p-chlorophenoxyacetic acid at 30 p.p.m. resulted in further yield increases. Tomatoes receiving N in 4 applications showed no yield responses, but the hormone treatment increased their yield from 7·1 lb. to 12·2 lb. per plant. Application of the growth regulator produced very few misshapen fruits, though a considerable number had unfilled locules. The treatment reduced the number of small tomatoes and advanced ripening.

2805. Siev, D., and Shmueli, E.
The effect of spraying with sugar solution on establishment of tomato transplants and on subsequent growth.
Bull. Res. Coun. Israel, 1953, **3**: 254, bibl. 2.

In the Jordan Valley tomatoes were sprayed with a 10% sugar solution on three successive days before planting out. The percentage of surviving transplants was 64·8, compared with 37·6 in the unsprayed plants. Subsequent growth of the transplanted tomatoes was better, and cropping was earlier than in the unsprayed plants. [See also *H.A.*, 24: 504.]

2806. Tarragan, M.
The effect of coumarin on the growth of tomato roots in cultures.
Bull. Res. Coun. Israel, 1953, **3**: 254-5, bibl. 6.

Varying concentrations of coumarin were applied to roots of the tomato variety Mormond, growing in tissue culture. Concentrations between 0·05 and 1·0 mg. per 100 ml. inhibited root growth; concentrations between 0·005 and 0·05 mg. per 100 ml. did not affect growth, whereas concentrations between 0·0001 and 0·005 mg. per 100 ml. stimulated growth.

2807. Brown, H. D., and others.
Effects of soil fertility levels on the quality of fresh and processed tomatoes, sweet corn, and cabbage.
Res. Bull. Ohio agric. Exp. Stat. **738,** 1953, pp. 32, bibl. 15.

Different amounts of N, P and K were applied to tomatoes under glass and to cabbage and sweet corn in the open. In tomato amount of fertilizer affected quality as measured by ascorbic acid content; decreases in ascorbic acid were brought about by increases in N and P, and increases by increases in K. Spring-grown tomatoes were higher than autumn-grown tomatoes in ascorbic acid and total solids and had a better colour. Amount of fertilizer affected ascorbic acid in cabbage but seasonal variations affected it more.

2808. Wiebe, J., and Carew, J.
Nitrogen treatment of plant bands.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 384-90, bibl. 5.

N at 4 levels and in 2 forms, urea and urea plus nitrogen salts, was applied to 2 types of organic plant band in which tomato and pepper seedlings were raised. N diffused from the bands through the soil fairly rapidly. Urea alone or the mixture of nitrogen salts and urea caused similar injury to the seedlings. High N levels in the bands caused greater injury in soil with high soluble salt content than in a soil with a low salt level. No difference in plant growth was detected between the 2 types of band. The effect of higher N levels in the bands increased with time and stimulated later growth.

2809. Montelaro, J., Hall, C. B., and Jamison, F. S.
Effect of magnesium sulfate on the rate of absorption of urea by tomato leaves.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 363-6, bibl. 6.

Subsequent to finding that $MgSO_4$ reduced foliar injury from applications of urea sprays to young tomato plants, studies were undertaken to determine its effect on the rate of urea absorption. The results clearly showed that addition of $MgSO_4$ to the spray solution reduced the intake of urea by the leaves. It would appear that the degree of foliar injury is directly proportional to the amount of urea absorbed within the first few hours of application. [See also *H.A.*, 23: 3173.]

2810. Majewski, F., and Majewska, W.
Badania nad wpływem boru na pomidory. **(Studies on the effect of boron on tomatoes.)**
[English and Russian summaries ¾ p. each.]
Roczn. Nauk Rol., Ser. A, 1953, **68** (1): 65-84, bibl. 36.

In sand culture experiments with the tomato variety Condine Red, deficiency symptoms appeared when the B content fell below 23–25 mg. per kg. dry weight of plant, and symptoms of toxicity when it rose to 200 mg. The effect of this element was most marked in the fruit, insufficient B inhibiting fruit setting and development.

2811. Marx, T., and Sahm, U.
Über den Einfluss von Mangan- und Bordüngungen auf den l-Ascorbinsäuregehalt der Tomaten. **(The effect of manganese and boron applications on the l-ascorbic acid content of tomatoes.)**
Z. PflErnähr. Düng., 1952, **59**: 157-61, bibl. 6 [received 1954].

Complete, Mn or B fertilizers had no significant effect on the vitamin C content of tomatoes. [See also *H.A.*, 22: 2657.]—Biol. Zentralanst., Berlin-Dahlem.

2812. Nicholas, D. J. D., and Thomas, W. D. E.
Some effects of heavy metals on plants grown in soil culture. Part I. The effect of cobalt on fertiliser and soil phosphate uptakes and the iron and cobalt status of tomato.
Plant and Soil, 1953, **5**: 67-80, bibl. 24, illus.

In a factorial pot experiment on tomato variety Market King, 3 rates of cobalt per pot, and 2 rates of phosphate fertiliser each labelled with 3 levels of P^{32} were applied to the soil; analysis was in two crops. Fe deficiency symptoms were produced at both harvests in the Co-treated plants, especially at the highest Co level, but total Fe expressed as μg. per g. dry weight was not appreciably affected. The injurious effects of Co on the plants were less marked at the higher fertiliser P level. The total and fertiliser P contents of the plants decreased with increased Co applications.

2813. Nicholas, D. J. D., and Thomas, W. D. E.
Some effects of heavy metals on plants grown in soil culture. Part II. The effect of nickel on fertiliser and soil phosphate uptakes and iron and nickel status of tomato.
Plant and Soil, 1954, **5**: 182-93, bibl. 12, illus.

In a factorial pot experiment on tomato, 3 rates of nickel sulphate per pot, and 2 rates of phosphate fertiliser each labelled with 3 levels of P^{32} were applied to the soil; analysis was made on two harvests. The first effect of the Ni treatments was the appearance of chlorosis of the young leaves, followed by severe necrosis of the stems, petioles and leaves and distortion of the plants. Total and fertiliser P contents were much reduced by the treatment. The injurious effect of Ni was not alleviated by increasing fertiliser P. The Fe status in mg. per g. was not related to chlorosis incidence; in fact it showed an increase.

2814. Salter, P. J.
Soil moisture control for tomatoes.
Grower, 1954, **41**: 781.

In experiments to determine the timing of irrigation of tomato plants [see also *H.A.*, 24: 507], the siting of the tensiometer is important. Its position must be representative of the whole area; mid-way between plants is satisfactory. The instrument is buried in the zone of greatest root development, which varies with different soils. At Sutton Bonington highest yields were obtained when the moisture tension did not exceed 7 cm. Hg. About an hour after watering some indication of whether sufficient water has been applied is given by the tensiometer: the ideal is to reduce the Hg to 4–5 cm., but for the tension to start rising again the following day. More experiments are needed before recommendations for commercial practice can be made.

2815. Anon.
Tomato diseases and their control.
J. Dep. Agric. Vict., 1954, **52**: 187-90, illus.

In Victoria there are four tomato diseases caused by bacterial pathogens, namely those caused by *Corynebacterium michiganense*, *Xanthomonas vesicatoria*, *Pseudomonas punctulans*, and *P. solanacearum*. A brief account of each disease is given, together with control measures.

2816. Rieuf, P.
Au sujet du dessèchement apical. **(Blossom end rot of tomatoes [in Morocco].)**
Terre maroc., 1954, **28**: 89-90.

The author, who previously discussed the causes of this disorder [*H.A.*, 22: 1602], now describes an experiment made in 1952. The ratio of affected fruit in the susceptible San Marzano variety grown under glass rose from 68% at a watering interval of 8½ days to 98–100% at one of 10½–22½ days (the volume of water per application being constant). He concludes that blossom end rot is due to a fall in the ratio between available soil water and the plant's physiological requirements and that growers could reduce its incidence by using plants with healthy well-developed root systems, cropping in fertile neutral soil, rotating crops, using balanced fertilizers in which P and K predominate, sowing direct and, above all, regulating the volume and interval of irrigations carefully.

2817. Kidson, E. B., and Stanton, D. J.
"Cloud" or vascular browning in tomatoes. III. Some observations on leaves and fruit of cloud-susceptible plants.
N.Z. J. Sci. Tech., Sect. A, 1953, **35**: 368-74, bibl. 2.

Leaves were found to vary in dry-matter percentage with position on the plant and time of sampling. Confirmation has been obtained of a lowered dry-matter percentage in the leaves of cloud-susceptible plants on a heavily-watered plot. Fruit varied in the time between setting and ripening from 9 to more than 15½ weeks. Fruit on a heavily-watered plot reached the low level of 4·4% dry matter a month from setting. The damage to the vascular system characteristic of cloud appeared to be associated with changes taking place in the fruit as it began to ripen on the plant. Fruit picked green from cloud-susceptible plants showed little cloud when ripened off the plant, but was of poor colour and texture compared with normal fruit ripened in the same way. [Authors' summary. See also *H.A.*, 23: 4303, 4304.]

2818. Young, P. A.
Crease-stem abnormality of tomato.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, p. 59.

Rutgers and similar tomato varieties exhibit crease-stem of which the symptoms are short internodes, bunchy top, rigidly upright stems and a flattened spot with a deep longitudinal groove in the upper part of each main stem. The disorder is apparently due to an unusual response to abundant nitrogen and water, and moderate temperatures. Affected plants fruit very late.

2819. del Chiaro, G.
Ricerche su alcuni caratteri colturali e fisiologici dell'agente della "pellagra" del pomodoro: *Alternaria porri* (Ell.) Neerg. f. sp. *solani* (E. et M. pro sp.) Neerg. **(Research on some cultural and physiological characters of the agent of tomato blight, *Alternaria solani*.)** [English summary 11 lines.]
Ann. Sper. agrar., 1954, **8**: 431-46, bibl. 5, illus.

Among the conclusions reached are that the common fungicides are efficacious against the pathogen and harmless to tomato seed.

2820. Wishart, R. L.
Early blight of tomatoes.
J. Dep. Agric. S. Aust., 1954, **57**: 289-94, bibl. 1, illus.

In 1952 and 1953, spray trials for the control of early blight of tomatoes caused by *Alternaria solani* were made in South Australia. Zineb proved to be the most effective material.

2821. Leben, C.
Influence of acidic buffer sprays on infection of tomato leaves by *Alternaria solani*.
Phytopathology, 1954, **44**: 101-6, bibl. 31.

In greenhouse tests with *Alternaria solani* on tomato leaves, acidic buffers applied as protective sprays gave 53% to 79% disease control. *A. solani* and some other plant-pathogenic fungi were found to be sensitive to acidic conditions in *in vitro* tests.

2822. Dye, D. W.
Differential effect of therapeutants on bacterial-canker of tomatoes (*Corynebacterium michiganense* (Erw. Smith) Jensen) and on late-blight (*Phytophthora infestans* (Mont.) de Bary).
N.Z. J. Sci. Tech., Sect. A, 1954, **35**: 462-4, bibl. 1.

Dwarf tomato plants, infected with bacterial canker, were sprayed with bordeaux mixture, thirospray, ascospray and phygon XL. Phygon XL reduced fruit infection by bacterial canker. Late blight was controlled efficiently by phygon XL and bordeaux, and to a lesser extent by thirospray.

2823. Beaumont, A.
Tomato leaf mould: spraying trials in Lancashire and Yorkshire, 1949-52.
Plant Path., 1954, **3**: 21-5.

Under normal conditions almost any fungicide gave satisfactory control of slight or moderate attacks. All copper fungicides are about equally efficient, but colloidal copper with a white oil emulsion is preferred as it leaves no visible deposits on the fruit. Of the non-copper fungicides, salicylanilide and zineb (nabam and zinc sulphate) are outstanding. Ziram has the drawback that it leaves heavy deposits on the fruit. Nabam with zinc sulphate was the only spray to remain efficacious in severe epidemics. [From author's conclusions.]

2824. Proctor, C.
Paint gun spray against tomato leaf mould.
Grower, 1954, **41**: 957-8, illus.

Salicylanilide used to control *Cladosporium fulvum* can be successfully applied as a low-volume spray through a paint gun. At Fernhurst, a concentration of 6 pt. of salicylanilide in 5 gal. water was used, at the rate of about 5 gal. per acre on mature plants. Treatment was repeated at weekly intervals during July and August.

2825. Stone, H. M., Clark, P. J., and Jacks, H.
Mercury residues on tomatoes.
N.Z. J. Sci. Tech., Sect. B, 1954, **35**: 301-6, bibl. 4.

Determinations were made of residual mercury on glasshouse tomatoes which had been sprayed with a phenyl mercuric salicylate aerosol. Adequate control of tomato leaf mould (*Cladosporium fulvum* Cke.) was obtained with applications made at 7-day intervals. Mercury residues did not exceed 0·05 p.p.m. [Authors' summary.]

2826. Baumgardt, J. P.
A study of fusarium wilt resistance in tomato plants.
Diss. Abstr., 1953, **13**: 962-3, being *Publ.* 6032 of 102 pp.

A histochemical study was made of fusarium-susceptible and fusarium-resistant tomato roots. The roots of resistant strains contained pentose and pentosan materials, and also polyphenols in the parenchyma cells immediately surrounding the xylem, and in these areas there was little or no fungal advance. These materials were absent in the roots of susceptible strains. It is concluded that some fusarium-inhibiting polyphenol may account for resistance in non-susceptible strains.

2827. Šutić, D.
Orobanche ramosa L. na crvenom patlidžanu u okolini Titovog Velesa. (***Orobanche ramosa*** **on tomato plants near Titov Veles.)** [English summary 5 lines.]
Zasht. Bilja, 1953, No. 20, pp. 43-6, bibl. 8.

For the control of *Orobanche ramosa* attacking tomatoes in one of the largest vegetable growing districts of Macedonia, destruction of the parasite, preferably before flowering, destruction of affected tomato stems after harvest, removal of susceptible weeds, deep ploughing and crop rotation are recommended. Tomatoes should not be planted on infested land, nor should they be irrigated with water flowing through infested land.

2828. Webber, E. R.
Root knot eelworm in tomatoes.
Grower, 1954, **41**: 473-5.

It is claimed that the most promising method of controlling *Heterodera marioni* in tomatoes is to water the soil about 1 week before planting with parathion at 1½ pints/100 gal. applied at about 1 gal. per sq. yd. When used at the recommended rate no parathion has been found in the tomato fruit.

2829. Dropkin, V. H.
Infectivity and gall size in tomato and cucumber seedlings infected with *Meloidogyne incognita* var. *acrita* (root-knot nematode).
Phytopathology, 1954, **44**: 43-9, bibl. 8, illus.

Measurements of infectivity and of gall size were made for possible use in differentiating variants of *Meloidogyne incognita* var. *acrita*, 3 lines of which are being studied. The infectivity of the species used was less for Marglobe tomato seedlings than for Improved Long Green cucumber seedlings. A high positive correlation is shown between gall area and number of larvae in the gall. The response of the root to the presence of the nematode is a local one and seems to be related to the amount of stimulation provided by each nematode. [From author's summary.]—Nat. naval med. Center, Bethesda, Maryland.

2830. Duddington, C. L.
Nematode-destroying fungi in agricultural soils.
Nature, 1954, **173**: 500-1, bibl. 2.

Forty-nine soil samples were taken from arable land and from glasshouses in Warwickshire in which tomatoes were grown and in many of which the potato root eelworm was causing damage. From these samples 82 records of nematode-attacking fungi were made, a list of which is presented. It is suggested that predacious fungi may be of potential value in the control of eelworms.—The Polytechnic, Regent Street, London.

2831. Pepper, B. B., Reed, J. P., and Starnes, O.
***Drosophila* as a pest of processing tomatoes.**
Ext. Bull. N.J. agric. Exp. Stat. **266,** 1953, pp. 8, illus.

By clean cultivation, and early and frequent picking of tomatoes some control of 3 species of *Drosophila* can be obtained in the field.

2832. Heinze, P. H., and Craft, C. C.
Effectiveness of ethylene for ripening tomatoes.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 397-404, bibl. 17, illus.

Results of experiments conducted at Beltsville indicate that ethylene is produced by ripening tomato fruit and that the rate of production increases as the fruit approaches a fully ripe condition. The rate of ripening of mature-green tomatoes in small tightly-closed chambers was not affected to any appreciable extent by the addition of ethylene. When the concentration of the emanations was kept low by ventilation the addition of ethylene caused a marked increase in the rate of ripening which was comparable with that of the fruit in closed containers.

2833. Barger, W. R., and others.
Transit and ripening studies with California mature-green tomatoes.
Veg. Crops Ser., Univ. Calif. **58,** 1953, pp. 26, also printed as *U.S. Dep. Agric., H. T. and S. Off. Rep.* **302.**

Tests were made to determine the transit temperatures and subsequent ripening responses of mature-green tomatoes during transcontinental shipment. Results showed the desirability of moderate temperatures (above 50° F.) especially late in the autumn.

2834. Krishnamurthi, S., and Subramanian, D.
Some studies on the effect of 2,4-dichlorophenoxy acetic acid in hastening the maturity of brinjals and increasing fruit set.
S. Indian Hort., 1954, **1**: 125-8, bibl. 3.

The application of 2,4-D to eggplant flowers advanced fruit maturation by up to 9 days and more than doubled fruit set. The most effective method was the application of paste but the simplest was spraying, which, at a concentration of 2 p.p.m., gave 58% fruit set (control 27%) and advanced maturation by 7 days. Dusting was the least efficacious method.—Dep. Agric., Annamalai Univ.

2835. McKeen, C. D.
Tobacco etch in peppers in southern Ontario.
Canad. J. Bot., 1954, **32**: 95-100, bibl. 15, illus.

Tobacco etch is one of the most prevalent and injurious viruses on sweet peppers in southern Ontario. The virus occurs in several strains. Detailed descriptions of symptoms on sweet, hot and semi-hot varieties of peppers are described. Symptoms on the pepper fruits have been observed chiefly on the sweet types. The widespread occurrence of etch on peppers is attributed to the prevalence of the vector *Myzus persicae* Sulz. Possible sources of etch that may give rise to epidemics on pepper and tobacco crops in southern Ontario are discussed. [Author's abstract.]

2836. Wene, G. P.
Control of the serpentine leaf miner on peppers.
J. econ. Ent., 1953, **46**: 789-93, bibl. 4.

In Texas, commercial control of serpentine leaf miner, *Liriomyza subpusilla*, was obtained during 1949, 1950 and 1951 with weekly applications of 5% chlordane, 2·5% aldrin or 2·5% dieldrin. During the 1952 pepper-growing season these treatments failed, but

2% parathion dust applied at 4-day intervals gave very satisfactory results as did EPN and metacide high-volume sprays. A leaf miner parasite, *Derostenus* sp., was reared from serpentine leaf miners found on peppers, blackeyed peas and cantaloupes.

2837. PEIRIS, J. W. L.
Chilli leaf curl complex.
Trop. Agriculturist, 1953, **109**: 201-4, bibl. 9, illus.

It is suggested that the chilli leaf curl complex has five different components, each having a different causal agent, either pest or virus. Types of leaf curl and mottle leaf found in chilli are described. Some control of the leaf curls caused by mites and thrips can be obtained by sulphur or nicotine sprays; those caused by virus diseases are more difficult to control.

Noted.

2838.

a ALEXANDER, L. J., AND HOOVER, M. M.
Progress report of National Screening Committee for Disease Resistance in the Tomato for 1952.
Plant Dis. Reptr, 1953, **37**: 317-24.

b ANON.
A Dutch air-conditioned [mushroom] house.
Bull. Mushroom Grs' Ass., 1954, No. 53, pp. 160-1.

c BREWER, H.
Kohlhernie. **(Club root.)**
Z. PflKrankh., 1954, **61**: 4-8, bibl. 42.
A review of work published in English.

d CHOPRA, R. N.
Occurrence of endosperm haustoria in some Cucurbitaceae.
Nature, 1954, **173**: 352-3, bibl. 2, illus.
In *Momordica*, *Trichosanthes*, *Luffa* and *Lagenaria* species.—Univ. Delhi.

e CURRENCE, T. M., AND EIDE, C. J.
A new muskmelon—Minnesota Honey.
Minn. Hort., 1954, **82**: 51, illus.

f DUTT, J. O., AND FLETCHER, R. F.
Vegetable varieties for Pennsylvania.
Circ. Pa agric. Ext. Serv. **425**, 1954, pp. 12, illus.

g GANDY, D. G., DUNCAN, C. W., AND EDWARDS, R. L.
The use of copper sulphate for control of "truffle" (*Pseudobalsamia microspora*).
Proc. int. Conf. sci. Aspects Mushroom Grg 1953, 1954, pp. 167-75, bibl. 5, illus.
See *H.A.*, 23: 4242.

h GEHRING, F.
Untersuchungen über die Keimung der Champignonsporen und die Wirkung von Chitinbakterien auf Basidiosporen mit unbekannten Keimungsbedingungen. **(The germination of mushroom spores and the effect of chitin bacteria on basidiospores with unknown germination requirements.)**
Angew. Bot., 1953, **27**: 97-105, bibl. 23, illus.

i HAHN, P.
Der Einfluss der Standweite auf Anbau und Ertrag bei Frührotkohl in besseren Anbaulagen. **(The effect of spacing on yield in early red cabbage in favourable localities.)**
Arch. Gartenb., 1954, **2**: 69-77.

j HAND, D. B., AND OTHERS.
The yield and quality of juice obtained from New York State tomatoes graded according to United States Department of Agriculture standards.
Bull. N.Y. St. agric. Exp. Stat. **759**, 1953, pp. 66, bibl. 30, illus.

k HENRIKSEN, A.
Forsøg med sorter af lave, grønne bønner 1949-51. **(Dwarf bean variety trials, 1949-51.)**
Tidsskr. Planteavl, 1954, **57**: 281-301 plus 4 plates.

l HILDEBRAND, E. M.
Sandstorm damage to tomato in Texas.
Plant Dis. Reptr, 1953, **37**: 445-6, illus.
Injury to fruit clearly illustrated.

m KRISHNAMURTHI, S., AND SUBRAMANIAN, D.
A report on certain types of fasciation observed in tomatoes.
Indian J. Hort., 1953, **10**: 107-11, bibl. 5, illus.

n LECLERG, E. L.
Seed-borne plant pathogens.
Plant Dis. Reptr, 1953, **37**: 485-92, bibl. 4.
A list including vegetable and flower seeds and bulbs and tubers.

o M—., S.
Chou de Bruxelles Rubis rouge. **(Rubis rouge brussels sprouts.)**
Rev. hort. Suisse, 1954, **27**: 122-3, illus.

p McLEAN, D. M.
Virus yellows of table beets in the Pacific Northwest.
Plant Dis. Reptr, 1953, **37**: 276-9, bibl. 13, illus.
Studies on occurrence, symptoms, vectors and control.

q MANN, L. K., AND MINGES, P. A.
Growing garlic in California.
Veg. Crops Ser., Univ. Calif. **59**, 1953, pp. 7.
The culture of garlic is fully described.

r MEZZETTI, A.
Una anguillulosi dei bulbi dell'aglio. **(Nematode attack on garlic bulbs.)**
Inf. fitopat., 1952, **2**: 83-6.
Ditylenchus dipsaci and control.

s NARAYANAN, E. S.
The painted bug, *Bagrada cruciferarum* Kirk.
Indian Fmg, 1954, 3 (10): 9, 27, illus.
On crucifers and its control.

Nietzke, G.
Beiträge zur Biologie und Epidemiologie der Zwiebelminierfliege *Dizygomyca cepae* Her. **(Biology and epidemiology of the onion pest, *Dizygomyca cepae*.)**
Z. angew. Ent., 1953, **35**: 249-70, bibl. 11, illus.
Life history.

u Preusker, H.
Eine Untersuchung über die Entwicklung der deutschen Gemüsesamenerzeugung und den Anteil der Geschützten Sorten. **(A study on the development of vegetable seed production in Germany and on the proportion of registered varieties.)**
Saatgut-Wirtsch., 1954, **6**: 90-2, bibl. 3.
Covers the period 1947-52.

v Scarchuk, J.
Storrs Green Hybrid summer squash.
Inf. Storrs agric. Exp. Stat., **50,** 1953, p. 7, bibl. 2, illus.
A new early variety.

w Sievers, E.
Untersuchungen über die Mycorrhizen von *Allium* und *Solanum*-Arten. **(Studies on the mycorrhizas of *Allium* and *Solanum* spp.)**
Arch. Mikrobiol., 1953, **18**: 289-321, from abstr. in *Z. PflKrankh.*, 1954, **1**: 31.

x Spencer, R. T.
Production of garden pea seed.
Agric. Gaz. N.S.W., 1954, **65**: 121-3, illus.

y Tkačenko, F. A.
The root systems of watermelon hybrids and varieties. [Russian.]
Agrobiologija, 1953, No. 13, pp. 156-9, illus.

z Twyman, R. C.
Brussels sprouts on the Cotswolds.
Agriculture, Lond., 1954, **60**: 580-3.
Propagation, cultivation and management.

2839.

a Vreeken, C. N., Sr.
Le chou de Bruxelles rouge "Rubine". **("Rubine", a red brussels sprout.)**
Bull. hort. Liège, 1954, **9**: 76-7, illus.

b Wallace, J. G.
Lothians vegetable-growing.
Scot. Agric., 1954, **33**: 180-2.
Recent developments.

c Yale, J. W., Jr., and Vaughan, E. K.
Ringspot-like virosis of rhubarb.
Phytopathology, 1954, **44**: 118-22, bibl. 2, illus.
[See also *H.A.*, 24: 1602.]

d Zaumeyer, W. J.
Snap bean breeding studies.
Seed World, 1954, **74** (7): 36, 47, illus.
Of the U.S. Dep. Agric.

TOBACCO.

General.

(*See also* 2181, 2867a, 2909, 3104, 3291, 3310.)

2840. Anon.
New [tobacco] classification system.
Rhod. Fmr, 9 April, 1954, pp. 19, 21.

To meet objections that classifications were too broad to give a true indication of the grades in the crop, the Southern Rhodesia Tobacco Marketing Board has adopted a revised list of specifications for use on the auction floors this year. The letters indicating the main groups, colours and special factors are retained, as also are the figures indicating the relative quality within each group, but the basis on which particular bales are allocated to particular qualities within each group is now more closely defined. The new specifications are listed.

2841. Southern Rhodesia.
Kutsaga.
[*Publ.*] *S. Rhod. Tobacco Res. Bd*, 1954, pp. 8, illus.
Stinson, F. A.
Tobacco Research Board of Southern Rhodesia. New headquarters station at Kutsaga.
Nature, 1954, **174**: 25-6.

The first is a popular illustrated brochure on Kutsaga Tobacco Research Station, the new headquarters of the Tobacco Research Board of Southern Rhodesia opened in January 1954. The second article, by the director, also describes the station and outlines the Board's research programme.

2842. van der Ven, L. F. J. M., and Loeters, J. W. J.
De tabaksverbouw in Baden (West-Duitsland). **(Tobacco culture in Baden, Western Germany.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1954, **17**: 215-27, illus.

A historical survey of the development of tobacco culture, and the organization of the growers in Germany is given. The cultural methods used in Baden are compared with those in Holland. Economics and research problems are noted.

Growth.

(*See also* 2154.)

2843. Puzzilli, M.
I movimenti d'accrescimento autonomi nelle infiorescenze della *Nicotiana glauca* e della *Nic. sylvestris.* **(Autonomous growth movements in the inflorescences of *Nicotiana glauca* and *N. sylvestris.***
Tabacco, 1954, **58**: 88-95, bibl. 6, illus.

In *Nicotiana glauca* the buds are pendulous but the flowers become erect owing to autonomous growth of the pedicels. In *N. sylvestris* the buds are erect, the open flowers become pendulous and the green capsules resume the erect position.—Ist. Orto bot., Univ. Perugia.

2844. Petrosini, G.
Sulla biosintesi della nicotina nei semi di tabacco in germinazione. **(On nicotine biosynthesis in tobacco seed during germination.)** [English summary ½ p.]
Tabacco, 1954, **58**: 39-55, bibl. 21.

Nicotine biosynthesis in germinating Kentucky tobacco seeds was investigated with the aid of paper chromatography. Seeds germinating in the dark in distilled water did not synthesize nicotine; various organic compounds (such as glucose, various organic acids and hormones) induced nicotine synthesis in seeds germinating in the dark. Seeds germinating in nutrient solutions in the dark synthesized nicotine as soon as the seed coat split; ions influencing synthesis are NH_4, Ca, Mg, and Fe; SO_4, PO_4, K and Na do not influence it. Illumination consisting of a minimum exposure of 20 minutes on the 4th day after germination induced nicotine synthesis.

2845. Miller, C., and Skoog, F.
Chemical control of bud formation in tobacco stem segments.
Amer. J. Bot., 1953, **40**: 768-73, bibl. 9.

Studies on the chemical control of bud formation in tobacco segments cultured aseptically suggest that both indoleacetic acid and adenine affect growth and organ formation of plant tissues through their influence on nucleic acid metabolism. [From authors' summary.]—Dep. Bot., Univ. Wisconsin, Madison.

2846. Puzzilli, M.
L'influenza delle piogge sulla produzione quantitativa del tabacco Virginia bright nella zona di Città di Castello. **(The effect of rainfall on quantitative production of Virginia bright tobacco in the Città di Castello district.)**
Tabacco, 1954, **58**: 84-7.

Yield was low when the May/July rainfall was high and *vice versa*. Cultivation should be deep and thorough to minimize the effects of excessive rainfall in May/July and of drought later in the season.—Ist. Orto bot., Univ. Perugia.

Soils and fertilizers.

2847. Giovagnotti, C.
Indagini sulla composizione del tabacco in rapporto alla fertilizzazione del suolo. **(Investigations on the composition of tobacco in relation to soil fertilization.)**
Ann. Fac. Agrar. Perugia, 1952, **8**: 128-40, bibl. 9.

Nine formulations of NPK were used in trials with Virginia Bright, Burley and Kentucky at the Tobacco Experimental Centre at Casalina in 1950. The chief results were: (1) In Virginia Bright and Burley nicotine diminished constantly from the basal to the apical leaves and nitrogen did the opposite. In all varieties there was a progressive diminution of ash from the basal to the apical leaves. The Schmuck coefficient and nicotine nitrogen rates were highest in the basal and apical leaves respectively. (2) Phosphatic fertilization gave an increase in nicotine and ash and a reduction in the Schmuck coefficient in Virginia Bright. (3) Potassic fertilization gave an increase in nicotine and a decrease in carbohydrates in the leaves of all 3 varieties. (4) Nitrogen fertilization gave an increase in nicotine in Kentucky and of nitrogen in Virginia Bright. Split application diminished the increase.—Ist. Indust. agrar., Univ. Perugia.

2848. Nyasaland.
Dark-fired tobacco. Flue-cured tobacco.
Rep. Nyasaland Dep. Agric., Part II, 1952 and 1953, 1954, pp. 9-11.

N gave large yield increases with both dark-fired and flue-cured, P had no effect, K increased the crop index of flue-cured. Delcrest and Mammoth did well in variety trials in both 1952 and 1953; in 1953 Bonanza (a low yielder in 1952) had the second highest yield, a high grade index and the highest crop index.

2849. Tombesi, L., and Giovannozzi, M.
Ricerche di fisiologia e di biochimica su *Nicotiana tabacum* var. Virginia Bright. Nota II. Nuovi criteri d'indagine relativi alla fertilizzazione applicati al Virginia Bright. **(Physiological and biochemical research on Virginia Bright. Note II. New lines of research on fertilization.)** [English summary 1½ p.]
Tabacco, 1954, **58**: 3-33, bibl. 6, illus.

Investigations on enzyme activity in relation to fertilization showed that (1) carboanhydrase activity is low in plants deficient in N; (2) catalase activity is low in plants deficient in N; (3) oxidase activity is much affected by N, P and K fertilization, catechol-oxidase activity being low in plants deficient in N and high in those deficient in P and K; (4) ascorbic acid and glutathione content are little affected by the fertilizer elements. The effects of the fertilizer elements were: (1) N reduced P_2O_5 content even when considerable quantities of P_2O_5 were also applied; (2) K and P_2O_5 both increased K_2O content; and (3) P_2O_5 reduced N content.

2850. van Bavel, C. H. M.
Irrigating flue-cured tobacco.
Bett. Crops, 1954, **38** (2): 19-22, 49-50, bibl. 3.

Droughts are common in the flue-cured tobacco areas of the U.S.A. It was shown in experiments over three years that, under these conditions, irrigation not only increased yields but also improved quality.

Diseases.

(*See also* 2397, 2970.)

2851. Anon.
Trashy leaf of tobacco.
Rur. Res. C.S.I.R.O., 1953, No. 4, pp. 18-20.

Trashy leaf is a physiological disorder of tobacco, which renders the leaf useless for manufacture. While uncured it is characterized by a very low sugar content and a relatively high nitrogen level. A lack of balance in nutrients has an immediate effect on the leafy part of the plant, and hence cultural practice should aim at producing maximum yield of leaf, with high carbohydrate status and low nitrogen content.

2852. Alcaraz-Mira, E.
Tobacco mosaic resistance in Spain.
Science, 1954, **119**: 296.

It is hoped to produce desirable commercial forms of mosaic-resistant tobacco strains from crosses obtained between resistant Ambalema tobacco and susceptible commercial strains. Some promising mosaic-resistant strains have been bred, but are not yet grown commercially.

2853. Kassanis, B.
Some effects of sucrose and phosphorus in increasing the multiplication of tobacco mosaic virus in detached tobacco leaves.
J. gen. Microbiol., 1953, **9**: 467-74, bibl. 10.

Tobacco mosaic virus reached higher concentrations when inoculated tobacco leaves were placed in a solution containing 10 g./l. sucrose and 0·2 g./l. calcium phosphate than when in water. Detached leaves in water usually produced more virus than leaves left on the plants. Other sugars and phosphates also increased virus production. Sugar and calcium phosphate sometimes separately increased the concentration of the virus, but the response was usually greatest to both together. The increase varied with the nutritional state of the plants from which the leaves came and some other environmental conditions. Virus concentration, and the effect of sucrose and calcium phosphate in increasing it, was greater when leaves were in the light than in the dark. Conditions which increased virus concentration also increased the total carbohydrates of the leaves. [Author's summary.]—Rothamsted exp. Stat.

2854. Bradley, R. H. E.
Ultra-violet irradiation of tobacco infected with potato virus Y and the availability of virus to aphids.
Nature, 1954, **173**: 350, bibl. 3.

The ultra-violet irradiation of White Burley tobacco leaves infected with potato virus Y reduced the availability of virus to aphids (*Myzus persicae*) placed on the leaves, without causing apparent injury to the plants or greatly reducing the infectivity of sap extracts. As previous work showed that *M. persicae* becomes infective when the stylets are inserted into the epidermis of infected plants and rarely, if ever, after they have penetrated into deeper tissues, it is postulated that the inactivating effect of ultra-violet irradiation in this latest experiment was restricted to virus in the epidermis.—Ent. Lab., Canada Dep. Agric., Fredericton, N.B.

2855. Bawden, F. C., and Kassanis, B.
Some effects of thiouracil on virus-infected plants.
J. gen. Microbiol., 1954, **10**: 160-73, bibl. 13, illus.

The rate of virus multiplication in tobacco leaves is decreased by spraying them with thiouracil solutions but less so than by floating them in such solutions. Factors affecting the action of thiouracil and the effect of the compound on viruses and on the host in tobacco, broad bean and french bean are discussed.

2856. Nichols, C. W.
Absorption of thiouracil by tobacco leaf tissue and inhibition of tobacco mosaic virus multiplication.
Phytopathology, 1954, **44**: 92-3, bibl. 6.

Leaf discs from tobacco leaves inoculated with tobacco mosaic virus were floated in aqueous solutions of thiouracil. An absorption by 16 44-mm. discs of 0·013 mg. per 24 hours was the lowest absorption that produced maximum virus inhibition.

2857. Oberthür, K.
Zur Bekämpfung der durch *Thielavia basicola* Zopf hervorgerufenen Wurzelbräune des Tabaks. **(On the control of root rot in tobacco caused by *Thielavia basicola*.**
Nachr.Bl. dtsch. PflSchDienst, Berlin, 1954, **8**: 50-6, bibl. 28, illus.

Steam sterilization and fumigation with formaldehyde must still be considered the safest means of controlling black root rot of tobacco, a disease of economic importance in Germany. None of the many fungicidal dusts or solutions tested proved fully satisfactory.—Institut für Tabakforschung, Wohlsdorf-Biendorf.

2858. Gigante, R.
Un marciume radicale causato da *Thielaviopsis* nei semenzai di tabacco del leccese. **(A *Thielaviopsis* root rot in tobacco nurseries in the Lecce district.)**
Tabacco, 1954, **58**: 71-83, bibl. 22, illus.

Black root rot was observed in Lecce tobacco nurseries for the first time in 1953. Notes are given on the symptoms, the biology of the pathogen, conditions favourable to the disease, means of spread, varietal resistance as observed in other parts of the world and means of control.

2859. Anon.
New burleys resist black shank.
Agric. Res., 1954, **2** (9): 16.

Two new tobacco varieties, Burley 11A and Burley 11B, are resistant to black shank [*Phytophthora* spp.] and to root rot [*Thielaviopsis basicola*].

Nematode and insect pests.

2860. Cairaschi, E. A.
Observations sur une maladie vermiculaire du tabac en Alsace. **(Notes on nematode attack on tobacco in Alsace.)**
C.R. Acad. Agric. Fr., 1954, **40**: 75-7, bibl. 1.

Moist conditions in June-July are indispensable for the development of *Ditylenchus dipsaci*, the chief species present. Control recommendations are deep cultivation before planting and regular shallow cultivations during growth to ensure good percolation and drainage, coupled with the use of nematocides.

2861. U.S. Department of Agriculture.
The tobacco budworm and its control.
Fmrs' Bull. U.S. Dep. Agric. **1531,** revised 1953, pp. 8, illus.

An account of the identification of *Heliothis virescens*, and its control by lead arsenate in corn meal bait and by TDE or DDT dusts and sprays.

2862. Santucci, F.
Il "*Pentodon punctatus*". *(Pentodon punctatus.)*
Tabacco, 1954, **58**: 96-105, bibl. 12, illus.

Notes are given on this beetle, the grubs of which cause considerable damage among recently planted-out tobacco seedlings, and on its control by soil application of BHC dust some days before transplanting.

Curing.

(*See also* 2867b.)

2863. Askew, H. O., and others.
Biochemical and physical changes in tobacco leaf during flue-curing.
N.Z. J. Sci. Tech., Sect. B, 1954, **35**: 344-63, bibl. 17.

Data for changes in weight and moisture content of tobacco leaves during flue-curing show that the rate of loss of water is governed by the temperature and humidity conditions in the kiln. In the early stages of curing, 93% to 95% of the loss of weight of the leaf is due to loss of water. During the colouring and fixing stages, rapid hydrolysis of starch to sugars, mainly glucose and fructose, and hydrolysis of protein-nitrogen to simpler compounds takes place. Increase in reducing-sugars content was proportional to the amounts of protein and of starch hydrolysed. Loss of dry matter can be nearly completely accounted for by requirements of water, by the products of hydrolysis, and by difference between over-all loss of starch and that required for formation of soluble sugars. Internal transformations involving no losses of dry matter may also have occurred. Variation in the contents of total non-volatile ether-soluble acids and malic acid was appreciable, but for oxalic and citric acids it was relatively small. Nicotine content did not vary during curing. No certain losses of total nitrogen were found. The pH value of the leaf did not vary. No variation occurred in soluble phosphate, soluble sulphur, protein-S contents or soluble calcium content during the curing of the leaf. [From authors' summary. See also *H.A.*, 24: 576.]

2864. Donadoni, S., and Garinei, D.
Applicazione di un aerotermo insufflatore ai locali di cura del Virginia Bright. **(The use of a hot-air pump in Virginia Bright curing chambers.)**
Tabacco, 1954, **58**: 56-61, illus.

Notes are given on a hand-operated hot-air pump, the use of which shortens the curing process by 12–30 hours. Air, preheated by the curing stove, passes through a system of circulating pipes before being released into the chamber. In flue-curing Virginia Bright in a natural draught kiln there is a danger of leaf browning during the change-over from the yellowing to the colour-fixing process through the slow action of the natural draught, due to the small difference between the temperature in and outside the chamber, in removing moisture. One to three minutes' work with the pump brings the R.H. down and sets the natural draught efficiently in operation again.

2865. Junnila, W. A., and others.
Firing of shade-grown tobacco with LP-gas.
Bull. Storrs agric. Exp. Stat. **300,** 1953, pp. 23, bibl. 6, illus.

Tests over a 2-year period showed that leaf quality was higher and fuel cost lower with a liquid propane gas-firing system than with the common charcoal-firing method for air-curing Connecticut Valley shade-grown tobacco. [See also *H.A.*, 23: 2021.]

2866. Cota Galan, R.
Influencia de la humedad en la combustibilidad del tabaco. I. Curvas de equilibrio higroscópico de tres variedades nacionales. **(The effect of humidity on the burning quality of tobacco. I. Curves of hygroscopic equilibrium in three Spanish varieties.)**
Bol. Inst. Invest. agron. Madrid, 1953, **13**: 391-405, bibl. 20.

The curves of hygroscopic equilibrium of 3 widely-grown Spanish varieties (Valencia, Santafé and Maryland) were calculated and the effects of different moisture contents on burning quality were studied. The 3 varieties were not very sensitive to changes in humidity within normal limits. The curves are considered to depend not only on variety but also on methods of handling.—Inst. Biol. Tabaco, Sevilla.

Noted.

2867.

a Pogliaga, H. H.
Híbrido intergenérico "*Nicotiana*×*Petunia*". II parte. (*A Nicotiana*×*Petunia* **hybrid. Part II.)**
Rev. argent. Agron. B. Aires, 1953, **20**: 144-6, bibl. 1, illus.
See also *H.A.*, 23: 853.

b Shepherd, J. L., and Rice, C. E.
Adaptation of tobacco barn for general crop drying.
Mim. Pap. Ga Coastal Plain Exp. Stat. **81,** 1953, pp. 5, illus.

c Vickery, H. B., and Palmer, J. K.
The metabolism of the organic acids of tobacco leaves. VII. Effect of culture of excised leaves in solutions of (+)-tartrate.
J. biol. Chem., 1954, **207**: 275-85, bibl. 27.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

General.

2868. Krochmal, A., Paur, S., and Duisberg, P.
Useful native plants in the American southwestern deserts.
Econ. Bot., 1954, **8**: 3-20, bibl. 52, illus.

The material assembled here may be considered supplementary to that previously presented [see *H.A.*, 19: 1701]. The maximum number of plants showing possibilities for providing drugs, food and condiments, fibres, gums and resins, insecticides, oils, essential oils, pigments, saponins, tannins and waxes is listed and the commercial exploitation of some, such as yuccas, agaves, creosote bush (*Larrea divaricata*), prickly pear, cucurbits and canaigre is considered.

Culinary and spice plants.

(*See also* 2922e, 3139, 3140.)

2869. McCormack, T. H.
Extraneous materials in spices.
J. Ass. off. agric. Chem. Wash., 1954, **37**: 157-61, bibl. 3, illus.

Spices imported by the U.S.A. sometimes contain excessive quantities of extraneous filth. Common among this material are 3 beetles and a moth which are described and illustrated. The efforts made by dealers to remove filth are usually successful, but certain spices, notably celery seed, resist all cleaning methods. Procedures adopted for the microscopic examination of spices are briefly indicated.

2870. Purewal, S. S.
Production of chillies.
Indian Fmg, 1954, **3** (12): 20-3, 32, illus.

Chillies (*Capsicum frutescens*) are extensively grown in Madras, Hyderabad, Bombay and Bihar; 90% of India's exports go to Ceylon. Notes are given on climatic and soil requirements, cultural practices, yield (250–1,000 lb. per acre for unirrigated and 1,500–2,000 lb. for irrigated crops), storage and diseases (principally mosaic or leaf-curl).

2871. Gutnikova, Z. I.
***Schizandra chinensis* in the Far East.** [Russian.]
Priroda, 1953, **42** (12): 104-5.

S. chinensis is a climbing shrub of the Far Eastern forests growing in deep, well-drained soils rich in humus. Its berries, used in wine making and confectionery, contain malic and citric acids; its seed is used in medicine. Both bark and seed contain essential oils.

2872. Maurel, M. A.
Contribution à l'étude des extraits de vanille. Nouvelles méthodes de dosage de la vanilline. (**A study of vanilla extracts. New methods of vanillin determination.**)
C.R. Acad. Agric. Fr., 1954, **40**: 163-5, bibl. 8.

Two new easy and quick methods of determining vanillin are described, one based on the effect of phenol, the other on that of aldehyde.

Drug plants.

(*See also* 2922f, g.)

2873. Zoz, I. G.
A new medicinal plant, *Ammi visnaga*. [Russian.]
Bot. Žurnal, 1953, **38**: 910-14, bibl. 10, illus.

Ammi visnaga, a source of khellin, is found growing freely in the eastern parts of the Caucasus, and attempts are now being made to cultivate it south of Kharkov. In preliminary trials in 1951 and 1952, plants raised under glass and planted out when 10–15 cm. high gave the best results. Direct seeding in the spring resulted in a rather late harvest (11 October), but autumn sowing showed promise and may well replace the more laborious transplanting method.

2874. Špilenja, S. E.
The biology of *Datura inermis*. [Russian.]
Agrobiologija, 1953, No. 6, pp. 141-4.

Results of trials in Leningrad with *D. inermis* showed that seed sown in groups of up to 25 at 50 × 50 cm. produced very satisfactory plants with a higher alkaloid content than that drilled 20 cm. apart in rows 40 cm. apart.

2875. Humphreys, F. R.
Rutin in the leaves of *Eucalyptus delegatensis*.
Aust. J. Sci., 1953, **16**: 30, bibl. 4.

Rutin, a pharmaceutical compound, has been found in commercial quantities of 3% to 4%, in the leaves of *Eucalyptus delegatensis*.

2876. Manske, R. H. F.
The alkaloids of papaveraceous plants. 1. *Dicranostigma lactucoides* Hook. F. et Thoms. and *Bocconia pearcei* Hutchinson.
Canad. J. Chem., 1954, **32**: 83-5, bibl. 6.

Dicranostigma franchetianum has been renamed *Stylophorum franchetianum* (Prain) comb. nov. because its alkaloids are the same as those of *S. diphyllum* [work reported in *Canad. J. Res. B*, 1942, 20: 53]. It is proposed to retain the name *D. lactucoides* because the contained alkaloids, namely protopine, isocorydine, sanguinarine and chelerythrine present a combination hitherto encountered only in a *Glaucium*. *Bocconia pearcei* was shown to contain, in addition to chelerythrine (and presumably sanguinarine), small amounts of protopine and allocryptopine. [Author's abstract.]

2877. Stromberg, V. L.
The isolation of bufotenine from *Piptadenia peregrina*.
J. Amer. chem. Soc., 1954, **76**: 1707, bibl. 4.

The leguminous shrub *Piptadenia peregrina* is now known to be the source of the narcotic snuff commonly inhaled by the natives of Haiti at the time of the discovery of the West Indies. *P. peregrina* seeds were found to be an excellent source of bufotenine.

2878. Rajagopalan, S.
Recent developments on *Rauwolfia serpentina* Benth.
J. Sci. industr. Res., India, 1954, **13B**: 77.

The alkaloid content of the roots of *Rauwolfia serpentina* produced in India is apt to vary with the region in which the plants are grown. Other factors which may result in sharp reductions in alkaloid content are the development of moulds on harvested roots and adulteration with the roots of other plants.

Essential oils.

(*See also* 2871, 2922a.)

2879. BROWN, E., AND ISLIP, H. T.
Stills for essential oils.
Colon. Plant Anim. Prod., 1953, **3**: 287-319, illus.

This is a memorandum prepared to assist Colonial distillers and especially those with no previous experience of the production of essential oils. The subject is dealt with under the following headings: General principles; Types of distillation; Processes accompanying distillation; Simple types of distillation apparatus (in some detail supported by 11 figures); and The selection and operation of a suitable type of still. There are 2 appendices, one giving a brief account of the theory of distillation and the other recommendations for the harvesting, preparation and distillation of each of 19 essential oil plants grown, or suitable for cultivation, in the Colonies.

2880. KHAN, A. H.
Essential oil bearing exotics suitable for Pakistan.
Agric. Pakistan, 1952, **3**: 48-53, bibl. 6.

Pakistan has no essential oil industry of any significance at present. The author gives notes on 40 species which form the backbone of the perfume and essential oil industry in other parts of the world and which might be suitable for East Pakistan with its humid tropical climate and for West Pakistan where the climate varies from arid sub-tropical to cold temperate.

2881. GUPTA, G. N., CHANDRA, G., AND NAUTIYAL, K. N.
Chemical examination of some new Indian essential oils.
Perfum. essent. Oil Rec., 1954, **45**: 80-4, bibl. 9, illus.

Data on the essential oils extracted from *Anthocephalus cadamba*, *Nyctanthes arboristes*, *Mimusops elengi* and *Cestrum nocturnum*. J.S.

2882. VODOPIVEC, S., SIVEC, S., AND TOMAŽIČ, G.
O santoninu iz jadranskega morskega pelina (*Artemisia caerulescens* L.). **(Santonin from the Adriatic wormwood *(A. caerulescens)*.)** [English summary 10½ pp.]
[*Publ.*] "*Nove Proizvodnje*", Ljubljana, 1953, pp. 46, bibl. 30, illus.

A report in 3 parts discussing the botany and composition of *A. caerulescens* and the therapeutic action of the santonin extracted from it.

2883. ROSENTHAL, C.
Untersuchungen zur Sortendiagnostik von Estragon. **(A study of variety identification in tarragon.)**
Züchter, 1954, **24**: 40-7, bibl. 14, illus.

The characteristics of the two varieties of *Artemisia dracunculus*, German aromatic tarragon and Russian tarragon, are described and illustrated. The ultimate breeding aim is to combine the oil quality of the former with the vigour, rust resistance and fertility of the latter. Before this can be achieved, however, the sterility of the German variety will have to be overcome. —Univ. Leipzig und Sortenamt f. Nutzpflanzen, Leipzig.

2884. HIROTA, N.
The oil of every part of the East camphor tree.
Perfum. essent. Oil Rec., 1954, **45**: 5-9, bibl. 6 and 41-9, bibl. 15.

Relationship between oils of the leaf, trunk, stump and root of each sub-variety of the camphor tree is discussed and comparisons made between the sub-varieties. J.S.

2885. JOACHIM, A. W. R., AND PANDITTESEKERA, D. G.
Investigations on the cultivation of citronella in Ceylon. I. The effect of organic and artificial fertilizers on the yield of grass and oil.
Trop. Agriculturist, 1953, **109**: 185-94.

Experiments carried out over 6 years with *Cymbopogon winterianus* and *C. nardus* showed that manuring with a complete artificial fertilizer was the most effective way of increasing yields of citronella grass and oil. Grass yields were 2 to 3 times as much as from unmanured plots, and oil yields nearly 4 times as much. Manuring maintained yields over a period of years and obviated the need for replanting. Though differences between the species were small, *C. winterianus* was the more profitable when fertilizers were used.

2886. FERNANDO, L. H.
Investigations on the cultivation of citronella in Ceylon. II. The influence of variety, frequency of harvests, and manure on the yield of grass at Embilipitiya.
Trop. Agriculturist, 1953, **109**: 195-200.

Experiments were carried out with *Cymbopogon nardus* and *C. winterianus* over a period of 4 years. The grass yield of *C. nardus* was higher than that of *C. winterianus*, but the difference did not exceed 10%. Yields were highest in the second year but manuring in the third year gave a 12% increase in yield. Cutting at 4-month intervals was better than cutting every 3 months.

2887. LYTKIN, I. A.
An experiment on the cultivation of coriander in Siberia. [Russian.]
Agrobiologija, 1953, No. 4, pp. 151-2.

Coriander seed produced under Siberian conditions (56° N. latitude and 91° E. longitude) with 60–80 frost-free days per year had a higher essential oil content than seed obtained at an important producing centre in the Voronež region. Untreated seed sown at the rate of 20–25 kg. per ha. in rows 30 cm. apart produced in 1949 and 1951 average yields of 7 cwt. per ha., but in 1952 plants raised from fermented seed yielded 8 cwt. per ha.

2888. PORTOLÉS ALONSO, A., AND CABO TORRES, J.
Essential oil of the Spanish dictamnus.
Inf. quim. Anal., 1953, **7**: 113-28, from abstract in *Analyt. Abstr.*, 1954, **1**: 362.

The oil content of dried heads [of *Dictamnus albus*] (max. found, 3·53%) from various locations, the distribution of oil in various parts of the plant (greatest in leaves) and the variation of oil content with stage of development of the plant (greatest at full flower) have been studied.

2889. Steiner, M., and Hochhausen, I.
Parallele Veränderungen von Blattform und Chemismus bei somatischen Mutationen von *Mentha.* **(Parallel changes in leaf shape and chemical composition in somatic mutations of *Mentha*.)**
Züchter, 1954, **24**: 47-8, bibl. 5.

In a population of *Mentha crispa* there were many plants with shoots bearing smooth leaves typical of *M. spicata* on the same rhizome as shoots with curled leaves typical of *M. crispa.* The refractive index of the oils from these two types of leaf showed the same differences as that of the oils of the two species which differ considerably in their carvone content. These findings suggest that essential oils, in contradistinction to alkaloids, are synthesized in the leaf.—Univ. Bonn.

2890. Choudhury, J. K.
Camphor and camphor oil from *Ocimum kilimandscharicum* Guerke.
Sci. and Cult., 1954, **19**: 354-5, bibl. 5.

The camphor and camphor oil contents of plants of *Ocimum kilimandscharicum* grown at Sukna in West Bengal in 1952/53 and the quality of the camphor were very high.

2891. Islip, H. T., Matthews, W. S. A., and Morton, D.
Sage leaves from Cyprus. (Interim report.)
Colon. Plant Anim. Prod., 1953, **3**: 342-51.

The results are reported of a preliminary examination of the oils in sage leaves collected in various localities and at different seasons in Cyprus. The species concerned was identified by Kew as *Salvia cypria.* The yield of oil in samples collected over the period April to September varied between extremes of 1·54% and 5·23%, increasing, on the average of all samples, at the rate of 0·77% per month. The yields of oil from leaves collected in the coastal region were generally lower than those from leaves from the mountainous region. The oils from some regions were laevo-rotatory and from others dextro-rotatory. The compound chiefly responsible for the optical activity of the oils appeared to be the ketone, camphor. No relationship appeared to exist between the ketone content of the oils and the time of collection of the leaves. Further work will have to be done before final conclusions and recommendations can be made.

Fibres.

(*See also* 3104.)

2892. Commonwealth Economic Committee.
Industrial fibres.
[*Publ.*] *Commonw. econ. Cttee*, 1954, pp. 165, H.M. Stationery Office, 5s.

This fifth post-war issue of *Industrial fibres* gives statistics of world production, trade and consumption for 1938/39 and the post-war years from 1947/48 to 1952/53. The fibres include sisal, manila hemp, henequen and *Phormium*, coir, and kapok.

2893. López H, R., and Loegering, W. Q.
Resistència de variedades de abacá (*Musa textilis* Nee) a la mancha de la hoja y pérdidas ocasionadas por la enfermedad. **(Resistance of different varieties of abacá (*Musa textilis*) to leaf spot, and the losses caused by the disease.)**
Turrialba, 1953, **3**: 159-62, bibl. 2, illus.*

Brown leaf spot of Manila hemp is a widely distributed disease in plantations of Central America. The symptoms of the disease are similar to the leaf spot of banana caused by *Helminthosporium torulosum* (Syd.) and *Cordana musae*. Bungulanon, the most widely planted variety in the region, is much more susceptible than 4 others studied, but the leaf area destroyed is not normally sufficient to affect growth.

2894. Raymond, W. D., Squires, J. A., and Ward, J. B.
Sisal wax from Kenya.
Colon. Plant Anim. Prod., 1953, **3**: 352-5.

Examination of samples of crude and refined sisal wax suggest that it is similar, though somewhat inferior, to sugar cane wax, and might prove a satisfactory substitute for carnauba wax in many formulations.

Hops.

(*See also* 2922d, 3287.)

2895. Institute of Brewing.
Annual Report of the Institute of Brewing [1953].
J. Inst. Brew., 1954, **60**: 87-125.

The report includes brief notes on hop research at (1) Wye College:—breeding, culture, nutrition and manuring, growth in swards, drying, machine picking; (2) East Malling Research Station:—disease research including wilt-tolerance and other tests of new varieties; and (3) the Brewing Industry Research Foundation:—chemistry.

2896. Richardson, F. N.
Production and distribution of the 1953 English hop crop.
J. Inst. Brew., 1954, **60**: 126-9.

New varieties. A limited number of brewers are interested in the new, or Wye, varieties, especially Northern Brewer, Bullion and Brewer's Gold, which are now well established, but research today is mainly directed to the discovery of acceptable varieties tolerant to *Verticillium* wilt and able to replace the two Keyworth varieties, OR55 and OJ47. *Goldings.* Last season 14·96% of the crop were Goldings and 7·96% Golding varieties, a total of about 23%. *Machine picking.* 30% of the Midlands, equalling 10% of the whole crop, is now machine-picked, and more machines are coming into use annually. Ninety-five will be operating this year, 26 of them in the South-East. The teething stage is not yet over, but the results this season show a very great improvement on previous years. It must not be assumed that the present machine will continue to hold its lead, and growers must keep a very open mind. The machine does pick very cleanly but it also causes too much breakage of the cones; perhaps 20% is broken hop.

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* Photostat of English original obtainable from Scientific Cummunications Service, Inter-American Institute of Agricultural Sciences, Turrialba.

2897. ASKEW, H. O., AND MONK, R. J.
Boron deficiency and uptake of boron in the hop plant.
N.Z. J. Sci. Tech., Sect. A, 1953, **35**: 279-300, bibl. 11, illus.

Failure of normal growth of hops accompanied by distortion of the leaves has been identified as being due to deficiency of available boron in the soil of affected gardens. A low boron content of young shoots is correlated with the presence of the ailment. It is considered that young shoots should contain 20 p.p.m. of boron in their dry matter. Borax at the rate of ½ oz. per hill has been safe, sufficient and effective in overcoming the deficiency symptoms. Borax applied as a soil dressing is readily absorbed by the plants, resulting in marked increase in boron content of leaves and cones. Normal boron contents of leaves and cones would appear to be 25 to 50 p.p.m., and 20 to 25 p.p.m. respectively. These values vary from season to season. The use of magnesite did not affect the intake of boron by the hop plant. The removal of boron in the hop cones each season corresponds to about 8 oz. of borax per acre. In plants not treated with borax this represents nearly half of the total intake of boron by the plant. [Authors' summary.]

2898. BARNSLEY, G. E.
The stripping of hops by chemical sprays.
Proc. British Weed Control Conf. 1953, Margate, pp. 312-19, illus.

In a field trial in Kent, a petroleum oil emulsion containing dinitrocresol applied at 100 gal. per acre with a commercial hop sprayer, removed or destroyed 80–90% of the leaves and side shoots of hops below the breast wire, and caused no yield reduction. While mature plants of 3 years or more were unharmed by the spray, younger plants sustained appreciable damage. The feasibility of protecting immature plants is discussed.

Insecticidal and rodenticidal plants.

(*See also* 3293.)

2899. CHANDLER, S. E.
Botanical aspects of pyrethrum: II. Further observations.
Pyreth. Post, 1954, **3** (3): 6-11, bibl. 1, illus.

Botanical and chemical studies were made of dried and living flowers of the Kenya C-47 strain. They concerned the oil glands and their relation to pyrethrin content, fluid oleoresin in living flowers, the morphology and development of the oil glands, and the occurrence of staminodes in ray flowers.

2900. EAST AFRICA HIGH COMMISSION (GLOVER, J., AND HARRISON, C. M. D.).
Pyrethrum "bud-disease".
A.R. E. Afr. Agric. For. Res. Org. 1953, 1954, pp. 32-3.

Research on pyrethrum ceased in 1953 except for nutritional studies which are being maintained for another year. *Spraying trials* confirmed last year's results [see *H.A.*, 23: 4400]. *Bud disease* [*Ramularia bellunensis*] *in relation to climate.* Investigations strongly suggest that the development of the disease at Muguga is largely due to the persistent wetness of the air associated with temperatures near dew point. The plants must be chilled to start bud development but the chilling temperatures needed are not much above dew-point, so that there is little scope for bud-stimulation without simultaneous occurrence of climatic conditions favourable to the disease. Fortunately, it would seem that persistent recurrence of very high humidities or actual dew are needed to start a flare-up in the disease, and these are only rarely encountered.

2901. CHEVALIER, A.
Action raticide des extraits de la scille maritime d'Algérie ou *Urginea maritima* (L.) Baker. **(Rodenticidal action of extracts of Algerian squills (*Urginea maritima*).)**
Rev. int. Bot. appl., 1953, **33**: 598-9.

A mixture of 2 glucosidic compounds (scillarene A and B, or scillarosides) prepared from *Urginea maritima* in Algeria is an effective rodenticide, causing death in 6 hours to 4 days.

Rubber plants.

(*See also* 3281.)

2902. TORRES, F. G.
Naturel et synthétique. **(Natural and synthetic [rubber].)**
Rev. gén. Caoutch., 1954, **31**: 173 (in French), 226 (in Spanish).

Spain's natural and synthetic rubber manufacturing industry provides for all national needs and has a small surplus for export. Plans have been made for growing *Hevea* in Spanish Guinea and Fernando Po on a scale sufficient to supply half Spain's needs, but shortage of labour delays their execution. Experiments in metropolitan Spain have shown that Huelva province is the most suitable area for guayule; 200 ha. of plantations now exist and the building of a pilot factory is under consideration. Guayule experiments are also taking place in Spanish Morocco. The plateau of Castille (Burgos, Palencia and Valladolid provinces) is the most suitable region for kok-saghyz but yields are unsatisfactory. Experimental results with other rubber plants, especially of the genus *Asclepias*, are encouraging.

2903. DE RAFOLS, W.
Experiencias ecólogicas sobre el "*T. kok-saghyz*" Rodin. Foto y termoperiodicidad. II. Formación de caucho. **(Ecological experiments on *Taraxacum kok-saghyz*. Photoperiodicity and thermoperiodicity. II. Rubber production.)** [English summary ¼ p.]
An. Inst. nac. Invest. agron. Madrid, 1954, **3**: 57-79, bibl. 8.

In continuation of previous research [see *H.A.*, 23: 945 and 23: 3293] the effects of light and temperature on the production of rubber and dry matter by *Taraxacum kok-saghyz* were studied under controlled conditions. The investigation covered the period up to the first flowering. Factors investigated were the effect of temperature on transplanting, the effect of temperature on rubber and dry matter production with an 8-hour artificial-light photoperiod, daylight v. artificial light, length of photoperiod, effect of temperature on growth early in life, effect of constant temperature in daylight, effect of variation of photoperiod and light intensity under low night temperatures and effect of temperature changes during the first 45 days after sowing.

Seed oils.

(*See also* 3104.)

2904. (Singleton, W. S.)
The physical properties of fatty acids, glycerides and derivatives. The technical literature and patents of the Southern Regional Research Laboratory, U.S. Department of Agriculture.
[*Publ.*] *U.S. Dep. Agric.* **AIC-361,** 1953, pp. 33.

This publication is designed for the use of those engaged in investigating and processing vegetable oil products and their derivatives. It contains 87 abstracts taken mainly from Southern Regional Research Laboratory lists of publications and from publications of the Bureau of Agricultural and Industrial Chemistry. The abstracts cover the period 1942/52 and most of them relate to cottonseed and peanut oil. A few, however, refer to tung, pecan, safflower and *Balanites aegyptiaca.*

2905. Tenembaum, J. L.
Economía del cultivo del ricino (*Ricinus communis*) y sus posibilidades en el país. **(Castor cultivation: economics and possibilities in Argentina.)**
Rev. Fac. Agron. Eva Perón, 1953, **29** (1): 1-26, bibl. 8.

After discussing the question from the cultural, industrial and economic angles the author concludes that there is no scope for large expansion of the castor industry in Argentina owing to the smallness of the internal market and the limited and fluctuating world market. In suitable areas, however, castor could be grown on a small scale in the way in which it is now profitably grown in Chajara and Monte Caseros, namely as a subsidiary crop raised by family labour on smallholdings situated near the processing plant.

2906. Ticó Roig, L.
El ricino, planta de interés nacional. **(Castor, a plant of national importance.)**
Rev. Inst. agric. Catalan S. Isidro, 1954, **53**: 38-43.

Notes are given on castor growing in north-eastern Spain: preparation of the ground, manuring and fertilizing, sowing, cultural practices, intercrops, pests, harvesting and yields (1,500–2,500 kg./ha. or more seed in annual crops and 2,500–3,000 in perennial crops).

2907. Chouard, P.
Conditions et facteurs nouveaux de la culture du ricin. **(Conditions and new factors in castor growing.)**
Oléagineux, 1954, **9**: 239-43.

This paper includes brief general notes on perennial cultivation and on dry and irrigated annual cultivation of castor beans, of which the average yields of decorticated capsules are quoted as 600–1,200, 1,000–1,500 and 1,800–2,000 kg. per ha. respectively. For perennial cultivation existing local varieties are generally suitable but selection is necessary; in Morocco *persicus* types such as Rouge de Fès, Agadir and Sanguin de Settat have given rise to hardy, adaptable strains. For annual cultivation American or European varieties are used, for example, Anjou, Baker 1, Blackwell, Cimarron and Conner. [See also *H.A.*, 23: 3296.]

2908. Virelizier, P.
Le ricin. **(Castor beans [in Morocco].)**
Terre maroc., 1954, **28**: 59-60.

Trials begun in 1950 by a firm holding the patent for a superpolyamide plastic made principally from vegetable materials have shown that both annual and perennial cultivation of castor beans is possible in Morocco. Perennial cultivation is suited to areas with deep well-drained soils and no extremes of temperature. Varieties earlier than the indigenous ones are grown on a 4–6 years' rotation at populations of 1,000–3,000 per ha. Yields are 1,000–1,500 kg. beans per ha. Cultural practices include cutting back early in the autumn, application of a complete fertilizer in winter, and several cultivations. In annual cultivation hardy early American varieties with a 5–6 months' growing cycle (Cimarron, Blackwell, Backer and Conner) are used. Their use permits the inclusion of castor in Moroccan rotations in dry and irrigated areas. Sowing is done in September/October in areas where there is no fear of frost or of waterlogging in the rainy season, or otherwise in spring. 20,000–25,000 plants are grown per ha. in rows 1 m. apart and yields range from 12,000 kg. per ha. in dry culture to nearly double that under irrigation. The chief pests, negligible in the annual crops, are red spider and some caterpillars.

2909. Grillot, G.
L'activité du service de la recherche agronomique et de l'expérimentation. **(The work of the agronomic research and agricultural experimentation service in Morocco in 1953.)**
Terre maroc., 1954, **28**: 35-47, illus.

Work included selection of vegetables and castor, and irrigation studies on White Burley tobacco and castor. Three promising strains of perennial castor (Rouge de Fez, 31 and Oued Beth) and 3 of annual castor (930, Conner and thorny Anjou) were isolated.

2910. Litzenberger, S. C.
Nicaraguan Criollo castor beans.
Agron. J., 1954, **46**: 98-9.

Nicaraguan castor bean collections show greater plant vigour and resistance to bacterial leaf spot than beans hitherto introduced into the United States and should be useful in plant breeding.

2911. Gurgel, J. T. A., and Valsechi, O.
Riqueza em óleo nas sementes, amêndoas e cascas das bagas de mamona. **(The oil content of whole castor beans, kernels and seed coats.)** [English summary and conclusions 1¼ p.]
An. Esc. sup. Agric. "Luiz de Queiroz" Piracicaba, 1952, **9**: 271-85, bibl. 7.

Statistical results are given of a study made of the oil content of a number of different strains of castor with a view to determining the best material for breeding purposes.

2912. Kudašev, I. S.
Localized application of fertilizers to castor bean plants. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1953, **18** (9): 26-31, illus.

On the Caucasian weakly calcareous chernozem soils the most satisfactory method of applying organo-mineral granulated fertilizers to castor bean plants is by placement in groups or in deep bands along both sides of the row. The best fertilizer for application at the time of sowing was a mixture of 50% compost, 35% superphosphate and 15% ash, used at 1 cwt. per ha. for row- and 0·5 cwt. per ha. for group-placement.

2913. Šmargonj, E. N.
Disbudding the castor bean plant. [Russian.]
Agrobiologija, 1953, No. 2, pp. 106-9, illus.

The removal of lateral inflorescences of castor bean plants by pinching back the growing points of the side shoots resulted in considerably better developed central flower clusters, the seeds of which ripened fully and evenly and thereby greatly simplified harvesting. It is recommended that the number of plants thus treated should be raised to 50,000 per ha. by spacing them 20–30 cm. apart in rows 70 cm. apart.

2914. Cangardel, H.
Essais de lutte contre l'araignée rouge du ricin. **(Experiments on the control of the castor bean red spider.)**
Terre maroc., 1954, **28**: 53-5.

Two systemics, 2 phosphoric esters and 2 sulphurs were used in experiments made near Rabat in 1953 on the control of red spider (*Tetranychus telarius*) on castor. Octamethylpyrophosphoramide was highly efficacious as a high-pressure spray but not as a low-pressure spray (9% and 57% infestation after 8 days compared with 81–82% in the control), but the poor results in the latter case may have been due to the low rate of application. The residual effect lasted 4 weeks. The effect of bis-dimethylaminofluorophosphine oxide first showed after about a fortnight, 54% compared with 87% in the control, and lasted 3 weeks. The phosphoric esters, both applied as high-pressure sprays, had a powerful but short-lived contact effect, and a residual effect of 3 weeks. The sulphurs were unsatisfactory.

2915. Brozzetti, P.
Possibilità e modalità di impiego del panello di ricino nell'alimentazione del bestiame. **(Possibilities of castor cake as stock feed.)** [English summary 13 lines.]
Ann. Fac. Agrar. Perugia, 1952, **8**: 211-38, bibl. 58.

Castor cake can be rendered non-toxic but has a comparatively low nutritive value despite its high N content and digestibility.—Ist. Zootech. gen. Univ. Perugia.

2916. Neumann, D.
Die Blühverhältnisse und der Frucht- und Samenansatz beim Ölkürbis (*Cucurbita pepo* L.) nach naturlicher und kunstlicher Bestäubung. **(Flowering, fruit set and seed formation in the oil pumpkin after natural and artificial pollination.)**
Z. Pflanzenz., 1952, **31**: 513-44, from abstr. in *Kühn-Arch.*, 1953, **67**: 401.

The treatment of first flowers with α-naphthylacetic acid (0·1, 0·05 and 0·01%) induced the formation of parthenocarpic fruits, while the application of the hormone to later flowers had no effect. The number of fruits per open-pollinated plant was found to be determined genetically and to be influenced by spacing and other cultural practices; inadequate pollination was not a limiting factor. In some strains a positive correlation existed between number of seeds and weight of fruit [see also *H.A.*, 23: 1979q].—Zentralanst. f. Pflanzenzucht (Erwin Baur-Inst.), Müncheberg/Mark.

Sundry plants.

2917. Dodge, C. W.
Some lichens of tropical Africa.
Ann. Mo. bot. Gdn, 1953, **40**: 271-401, bibl. in text.

The descriptions are based mainly on specific collections from specimens originating in Nigeria, the Cameroons, Sierra Leone, Uganda and Nyasaland.

2918. Rudolph, E. D.
A contribution to the lichen flora of Arizona and New Mexico.
Ann. Mo. bot. Gdn, 1953, **40**: 63-72, bibl. 19, illus.

Most of those found are crustaceous rock-inhabiting lichens which form a conspicuous element in the vegetation of acid mountainous regions. Descriptions are given of specimens and habitat.

2919. Sproston, T., Jr., and Scott, W. W.
***Valsa leucostomoides*, the cause of decay and discoloration in tapped sugar maples.**
Phytopathology, 1954, **44**: 12-13, bibl. 9, illus.

Valsa leucostomoides Pk. and the asexual stage *Cytospora* have been found to be the principal cause of the decay and discoloration associated with tapping. It is suggested that tap-holes be spray-painted at the time the spout or spile is pulled at the end of the season, to avoid infection. [From authors' summary.]—Dep. Bot., Univ. Vermont, Burlington.

2920. Anon.
Labrador tea.
From abstr. in *Econ. Bot.*, 1954, **8**: 47.

During the American Revolution the leaves of this low evergreen shrub, *Ledum groenlandicum*, growing in Canada and the northern United States served as a substitute for India tea. The more northern species, *L. palustre*, has been reported preferable for this purpose, while a western species, *L. glandulosum*, is said to be poisonous.

2921. Courtney, W. D.
The teasel nematode, *Ditylenchus dipsaci* (Kühn, 1857), Filipjev, 1936.
J. Wash. Acad. Sci., 1952, **42**: 303-9, bibl. 4, illus.

This serious pest of teasel crops in the Pacific Northwest can be effectively controlled by soil and seed treatment. Soil can be cleared of nematodes by rotation with non-host crops provided it is kept free of weeds. Seed can be freed by treatment with water, with or without the wetting agent Vatsol O.S., at 122° F. for 1 hour or 120° F. for 2 hours, using twice as much seed as required, since the treatment reduces germination.

Noted.

2922.

a Anon.
Cassia.
Amer. Perf. and Ess. Oil Rev., 1953, **61**: 280, from abstr. in *Econ. Bot.*, 1954, **8**: 28.
Acacia farnesiana cultivated in southern France for its flowers, used in perfumery.

b Bisset, N. G.
The steroid glycosides of the Apocynaceae. Part I.
Indones. J. nat. Sci., 1953, **109**: 173-211, bibl. 233.

c Brown, N. C., Phipers, R. F., and Singleton, K. G.
The estimation of "false" pyrethrins in pyrethrum extracts.
Pyreth. Post, 1954, **3** (3): 3-5, bibl. 11.

d Cairaschi, E. A.
"La mosaique chlorotique", nouvelle maladie à virus du houblon en Alsace. **(Chlorotic mosaic, a new virus disease of hops in Alsace.)**
C.R. Acad. Agric. Fr., 1954, **40**: 77-8.
A disease not previously recorded on the continent.

e Escalante, M. G.
Las mentas cultivadas en la Argentina. **(Mint species cultivated in Argentina.)**
Rev. Farmac., 1953, **95** (5/6): 99-106, from abstr. in *Rev. Fac. Agron. Eva Perón*, 1953, **29** (1): 130-1.
Keys are given.

f van Haga, P. R.
Alkaloids in germinating seeds of *Atropa belladonna.*
Nature, 1954, **173**: 692, bibl. 3.

g Hess, H.
Über einige neue *Strophanthus*-Arten und-Bastarde aus Angola (Afrika). **(On some new *Strophanthus* species and hybrids from Angola, Africa.)**
Reprinted from *Ber. Schweiz. bot. Ges.*, 1952, **62**: 80-103, bibl. 9, illus.

h Mitchell, W.
Note on recent changes in the A.O.A.C. method for the assay of pyrethrins.
A new method for assay of the pyrethrins.
J. Sci. Food Agric., 1953, **4**: 246-8, bibl. 5, 278-81, bibl. 11, repr. in *Pyreth. Post*, **3** (3): 20-2, bibl. 7, 15-18, bibl. 11.

i Muthuswamy, S.
The culture of drumstick, *Moringa pterygosperma* (Goertn.) syn. *Moringa oleifera* Lam. [in South India].
S. Indian Hort., 1954, **2**: 18-21, bibl. 4.

j Sackston, W. E.
Foot and root infection by safflower rust in Manitoba.
Plant Dis. Reptr, 1953, **37**: 522-3, bibl. 3, illus.
Attributed to *Puccinia carthami.*

k Ward, J.
Separation of the "pyrethrins" by displacement chromatography.
Chem. Ind. Lond., 1953, No. 24, pp. 586-7.

FLORICULTURE.

General.

(*See also* 2162, 2163, 2169, 2170, 2315, 2396, 2397, 2448, Section on Weeds and weed control, 2622, 2653, 2838n, 3011h, r, w, 3289, 3291, 3321k.)

2923. Mameli-Calvino, E.
La floricoltura industriale in Italia. **(Commercial flower growing in Italy.)**
Ital. agric., 1954, **91**: 81-118, bibl. 27, illus.

Historical notes on the Italian floricultural industry are followed by statistics of current production (species, area, value) in various parts of Italy, and of exports. Liguria, mainly the province of Imperia, produces 90% of the Italian total. Exports, mainly to Switzerland and Germany, of outdoor-grown flowers have mounted rapidly since the war but have not reached the pre-war figure and are facing increasing competition from other countries. The principal cut-flower species are carnations, roses, mimosa (acacias) and chrysanthemums, and the chief bulb and rhizome species are gladioli, anemones, ranunculus, freezias and narcissi. The chief species grown for their ornamental branches, fruits or leaves and as ornamental pot plants are also listed. Steps needed to enable the industry to continue its expansion are greater production per ha., breeding for improved quality, the founding of horticultural schools of various grades, the equipping of the San Remo Floricultural Experimental Station (the only scientific institution in Italy specializing in flower growing) commensurately with its national status, and the provision in the province of Imperia of an airport for flower exports.

2924. Clark, B. E., and Little, H. B.
The quality of seeds on sale in New York as revealed by tests completed in 1952.
Bull. N.Y. St. agric. Exp. Stat. **757**, 1953, pp. 49.

Very few vegetable seed samples were unfit for planting because of low germination or unsatisfactory varietal purity. Flower seeds showed an improvement over 1951 [see *H.A.*, 22: 3340], but many samples still showed excessively low germination, especially perennials (21% worthless). Many lawn grass mixtures contained too low a proportion of permanent lawn grass seeds to be satisfactory for establishing permanent turf.

2925. Lipp, L. F.
New methods in plant propagation.
Arnoldia, 25 Sept., 1953, condensed in *Brooklyn bot. Gdn Rec.*, 1953/54, **9**: 276-9, illus.

The use is described of coverings of polyethylene plastic film to maintain high humidity around cuttings, for storing stratified seeds and for wrapping balled root systems when transplanting. [See also *H.A.*, 23: 3305.]

2926. Mitchell, W. G.
Propagating by constant mist.
Flower Gr, July 1953, condensed in *Brooklyn bot. Gdn Rec.*, 1953/54, **9**: 280-1.

Ornamentals that have rooted well under constant mist in Florida are listed. The construction of a mist system is briefly described.

2927. Langhans, R. W.
Mist propagation and growing.
Bull. N.Y. St. Flower Grs, 1954, No. 103, pp. 1-3, illus.

In experiments with mist propagation the timing interval used was 4 seconds on and 56 seconds off for 8 hours a day. The nozzles were placed on both sides of the bench and staggered 18 inches apart; accurate shut-off of the mist was obtained with a spring-loaded solenoid valve. Four-inch or 14-inch chrysanthemums were rooted in full sunlight in 7 to 12 days. Five-, 14- and 24-inch Better Times rose cuttings rooted in full sunlight in 18 days. Cattleya orchids and Rex begonias were grown in full sunlight under the mist: under the mist double the usual number of buds broke on dormant Better Times rose plants.

2928. Vasiljev, A. V.
The effect of winter 1949/50 on tropical and subtropical plants at Suhumi. [Russian.]
Bot. Žurnal, 1953, **38**: 650-60.

A description is given, in tabulated form, of frost damage sustained by 139 plant species, in various stages of acclimatization, during the coldest winter since meteorological data were first taken at Suhumi in 1872. Some 1,000 species of economic and ornamental plants grown in the Soviet Subtropics were examined following this very cold winter, and it was found that 86·8% were not damaged by frost. The majority of those injured recovered and only 3·5% were killed.

2929. Röszler, P.
Sauerstoff und Hydrokultur. **(Oxygen and hydroponics.)**
Pflanze, 1954, No. 2, pp. 1-3, illus.

A nutrient tablet (Erlopa-Super-Gartendünger), which will give off O_2 during its decomposition, has come on the market for the water culture of pot plants. As the development of such plants is liable to be checked by an inadequate O_2 for the roots, the design of hydropots had to be elaborate to allow for sufficient O_2 supply. This will no longer be necessary.

2930. (Linz, E.)
Ein neues Bauelement, das Blumenfenster aus Eternit. **(Eternit, a new material for making window boxes.)**
Schweiz. Gärtner Ztg, 1954, **57** (14): 5-6, illus.

A new window box is described. The bottom of the box, which is made of the material Eternit, is filled with water, the flower pots standing on a frame of meshed wire just above the water. Provisions are made for aeration and convenient watering. The design of the box is illustrated and further possible requirements are discussed.

Annual and herbaceous plants.

(*See also* 2182, 2643, 2924, 3011c, e, g, k, p, s, 3011v, x.)

2931. Tsukamoto, Y., Sakanishi, Y., and Mega, K.
Forcing and retarding cut flowers by intermittent lighting. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1953, **22**: 177-82, bibl. 8, illus.

The effect of intermittent additional light in delaying flowering in short-day plants and in forcing long-day plants was studied. Chrysanthemums received light for one hour per night at times ranging from 8–9 p.m. to 6–7 a.m. from 15 August to 10 October; delay was greatest (40 days) when the lighting was given from 2 to 3 a.m. Asters and shasta daisies received 5 treatments: (1) light treatment in the evening up to 9 p.m. and from 3 a.m. to dawn; (2) 11 p.m.–12 a.m.; (3) 1–2 a.m.; (4) all night; (5) control. With aster results were indefinite. With shasta daisy the length of the period of illumination rather than the exact time at which light was given was all-important.

2932. Maramorosch, K.
Incubation period of aster-yellows virus.
Amer. J. Bot., 1953, **40**: 797-809, bibl. 41, illus.

Data are given on the incubation period of aster-yellows virus in China aster (*Callistephus chinensis*) and in the aster leafhopper (*Macrosteles fascifrons*).

2933. Wellensiek, S. J.
De physiologie der bloemvorming in *Campanula medium*. **(The physiology of flower formation in *Campanula medium*.)**
Reprint from *Proc. Kon. ned. Akad. Wetensch.*, 1953, **62** (8): 115-18.

Experiments with the biennial *Campanula medium* over 6 years have shown its reaction to day-length and temperature. Vernalization for 4 weeks followed by long-day treatment and warmth was sufficient to produce flower buds. Cold alone also gave results, but in this case about 3 months elapsed before the plants responded. Short-day treatment for 4 weeks followed by long-day treatment in warmth also gave flowers; there was again a juvenile phase, but it was about a month shorter than that for cold treatment. The difference in duration of the juvenile stage for cold and short-day treatments makes it improbable that the response to cold and short days is the same. Further results and details are to be published elsewhere. [See also *H.A.*, 23: 3317.]

2934. Ministry of Agriculture.
Carnations under glass.
Bull. Minist. Agric. Lond. **151**, 1954, pp. 34, bibl. 7, illus., 3s.

Full cultural details are given for growing carnations on a commercial scale in the U.K., both in soil under glass and in soilless culture. The amateur will find it no less interesting than the professional.

2935. Holley, W. D.
Propagate carnations with large cuttings.
Colo Flower Grs' Bull., 1954, No. 51, pp. 2-4, from abstr. in *N.Y. St. Flower Grs' Bull.*, 1954, No. 102, p. 8.

Plants from large cuttings produced more and earlier flowers than plants from small cuttings with no difference in quality.

2936. Puccini, G.
Ricerche sulla nutrizione del garofano rifiorente della Riviera. **(Research on the nutrition of the perpetual-flowering carnation on the Riviera.)** [English summary 16 lines.]
Ann. Sper. agrar., 1954, **8**: 613-27, bibl. 6.

Chemical analyses made at intervals throughout the growing cycle of Anita carnations grown for cut flowers showed that (1) the plant forms reserves of nitrogenous substances in the "tufting" phase (the vegetative period between planting and budding); and (2) the $N:P_2O_5:K_2O$ ratio throughout the cycle approximates 1·0: 0·5: 1·5.—Staz. sper. Floric., Sanremo.

2937. Thomas, W. D., Jr.
Malformation of carnation blossoms caused by aster yellows virus.
Plant Dis. Reptr, 1953, **37**: 284, bibl. 3, illus.

A flower malformation is described which occurred on Hercules carnations infected by streak caused by aster yellows virus. Two other carnation varieties grafted to streak-infected plants developed no malformations.

2938. Iwama, S., and Iwai, S.
Responses of fall-flowering chrysanthemum varieties to photoperiod and temperature. (I.) [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **22**: 249-56, bibl. 17.

Of 17 chrysanthemum varieties studied 3 were influenced only by temperature and 14 mainly by day-length. Among the latter differentiation and development of flower buds took place when day-length had been reduced to 14·5 and 13·5 hours respectively, and 4 varieties were forced and 10 retarded by higher temperatures.

2939. Asen, S., Wittwer, S. H., and Hinsvark, O. N.
Foliar absorption and translocation of radio phosphorus by *Chrysanthemum morifolium*.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 466-70, bibl. 12, illus.

Tracer studies have shown that appreciable quantities of radio phosphorus are absorbed by leaves of chrysanthemum plants, and translocated to the roots. Increasing the number of foliar applications resulted in a significant increase in total phosphorus in the roots as well as an increase in the percentage of the total phosphorus derived from treatment. Apparently over 8% of the total phosphorus in the roots was derived from 4 successive foliar applications of a 0·3% solution of o-phosphoric acid within a 15-day period. The absorption of foliar-applied phosphorus also resulted in an increase in dry weight of both the roots and top portions of the plant. [Authors' summary.]

2940. Messing, J. H. L., and Owen, O.
The visual symptoms of some mineral deficiencies on chrysanthemums.
Plant and Soil, 1954, **5**: 101-20, bibl. 26, illus.

The visual symptoms of the deficiencies of nitrogen, phosphorus, potash, calcium, magnesium, manganese and boron on indoor chrysanthemums are described in detail and illustrated. Fifteen varieties were grown in sand cultures and their behaviour studied. The importance of varietal susceptibility and effect of season are established. [Authors' summary.]

2941. Wilhelm, S., and Sciaroni, R. H.
Verticillium in chrysanthemum.
Calif. Agric., 1954, **8** (5): 9-10, illus.

Verticillium wilt of chrysanthemum [*Verticillium dahliae*] can be controlled by yearly fumigation with chloropicrin, at a rate of 23 to 35 gal. per acre. Returns after fumigation more than offset the rather high cost of treatment.

2942. Schread, J. C.
Chrysanthemum gall midge.
Bull. Conn. agric. Exp. Stat. **554**, 1952, pp. 6, bibl. 2, illus.

Chrysanthemum gall midge (*Diarthronomyia hypogaea*), a persistent and serious pest of greenhouse chrysanthemums, can be controlled by spraying plants or cuttings with lindane emulsion at the rate of 1 pint in 100 gal. of water; 1 to 1½ lb. of wettable powder may be substituted. More complete control may be obtained by 2 sprays at an interval of 5 to 7 days.

2943. Stinson, R. F.
***Gerberia jamesoni*: I. A study of flower production and quality at several pH values.**
Proc. Amer. Soc. hort. Sci., 1953, **62**: 487-90, bibl. 5.

Gerberia jamesoni [*Gerbera jamesonii* R.H.S. Dict. Hort.] grown in soils within a pH range of 5 to 7·2 produced significantly more flowers and slightly longer flower stems than when grown at a soil reaction below pH 5. Flower diameter did not seem to be influenced by the pH of the soil.—Storrs agric. Exp. Stat., Conn.

2944. Munnecke, D. E., and Chandler, P. A.
Some diseases of variegated peperomia.
Plant Dis. Reptr, 1953, **37**: 434-5, bibl. 1, illus.

A short account is given of the following diseases affecting *Peperomia obtusifolia* var. *variegata* in California: (1) Rot of leaf cuttings due to *Rhizoctonia solani* and to a lesser extent *Pythium* and *Phytophthora* spp., controllable by selection of cutting material and sterilization of rooting media and soil; (2) oedema, which is graft-transmissible and hence presumably of virus origin and can be controlled by roguing; (3) greyleaf or dirty-leaf of which the cause is unknown; and

(4) slugs which can be controlled by 15% metaldehyde dust.

2945. POGORLECKIĬ, B. K.
Vernalization of perilla in the dark. [Russian.]
Agrobiologija, 1953, No. 3, pp. 153-4.

Of 4 methods of seed treatment tried to hasten the development of perilla, vernalization of seeds of 40% moisture content at 25° C. for 14 days in the dark was the most satisfactory. Plants began to flower 11 days earlier than when similar seed was vernalized in light and 26 days earlier than the controls. Vernalization of dry seed in either dark or light was ineffective.

2946. MEAHL, R. P., LITTLE, L. D., Jr., AND ATMORE, S.
1952 petunia trials at The Pennsylvania State University.
Progr. Rep. Pa agric. Exp. Stat. **113A**, 1954, pp. 23, illus.

Petunia varieties of double, giant ruffled, *grandiflora*, *multiflora* and *nana compacta* types were tested in Pennsylvania, and are here discussed.

2947. MCQUADE, H. A.
Some X-ray effects in petunia.
Ann. Mo. bot. Gdn, 1953, **40**: 259-67, bibl. 5.

945 *Petunia* plants were grown to maturity from seed arising from X-irradiated sperms or X-irradiated eggs. No effects were noticeable in 739. Of 206 showing X-ray effects 38 died. Whether or not phenotypic effects occurred, a high percentage of pollen was rendered non-viable by X-ray treatment. No phenotypic effects were seen in plants when X-ray effects were due to treatment of pollen as opposed to treatment of ovaries. Resulting changes in leaf morphology are considered.

2948. FLINT, H. L., AND ASEN, S.
The effects of various nutrient intensities on growth and development of snapdragons (*Antirrhinum majus* L.).
Proc. Amer. Soc. hort. Sci., 1953, **62**: 481-6, bibl. 7.

Snapdragons of an inbred variety and a hybrid variety were grown in sand culture at 5 different nutrient levels. Nutrient solutions having osmotic pressures of 0·19 and 0·38 atmospheres produced satisfactory growth, but those with greater than 0·73 atmosphere caused chlorosis, fading of flower colour, abnormal flower carriage, fewer flowers, decreased dry matter production and shorter and weaker stems. N, P and K content of leaves increased with the concentration of these elements in the solution; Ca and Mg contents showed no correlation with treatment. The hybrid variety was more vigorous and had slightly higher nutrient requirements, but was more sensitive to the high nutrient levels than the inbred variety.

2949. COOK, R. L., ERICKSON, A. E., AND KRONE, P. R.
Soil factors affecting constant water level sub-irrigation.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 491-6, bibl. 2, illus.

Snapdragons were grown in 2 soils in 8 to 24 in. lengths of 8-inch glazed tiles standing in shallow pans of water. In a sandy loam the best quality blooms were obtained in the tallest tiles, where the soil depth above the water table was 21 in. In shallower soil columns the water rose too rapidly and too high for good aeration and growth. With a clay loam, 9 in. of soil above the water table was required for optimum flower production. Where the soil depth was 13 in. or more, surface watering was necessary to get the plants started.

2950. GEISSMAN, T. A., JORGENSEN, E. C., AND JOHNSON, B. L.
The chemistry of flower pigmentation in *Antirrhinum majus*. Color genotypes. 1. The flavonoid components of the homozygous P, M, Y color types.
Arch. Biochem. Biophys., 1954, **49**: 368-88, bibl. 20.

The chemical effects of the 3 colour factors, P, M, and Y in *Antirrhinum majus* were studied with respect to the aglycones of the flavone, flavonol, aurone and anthocyanin glycosides present in known homozygous colour types. Anthocyanidins and flavonols are present only when P is in the dominant condition. The M factor controls the oxidation state of the C_6(B)-ring in the flavones, flavonols and anthocyanidins. The Y factor seems to operate at an early stage in synthesis, aurone being formed in small amounts when it is dominant and in large amounts when it is recessive.

2951. TASMANIAN DEPARTMENT OF AGRICULTURE, PLANT PATHOLOGY DIVISION.
Diseases of the antirrhinum.
Tasm. J. Agric., 1953, **24**: 366-9, illus.

Notes on damping-off, stem rot (*Phytophthora cryptogea*), downy mildew, anthracnose or shothole (*Heteropatella antirrhini*), rust (*Puccinia antirrhini*) and "dry stem" (an apparently non-parasitic disorder of unknown cause), and their control. Rust has not yet been recorded in Tasmania.

2952. FROST, H. B., AND LESLEY, M. M.
High-double stock varieties.
Calif. Agric., 1954, **8** (2): 11-12, illus.

A trisomic double-thrower stock, Slender, gives seed with a particularly high proportion of doubles; singles, while still seedlings, can be identified by narrow, long-petioled leaves.

2953. BAKER, K. F., MATKIN, O. A., AND DAVIS, L. H.
Interaction of salinity injury, leaf age, fungicide application, climate, and *Botrytis cinerea* in a disease complex of column stock.
Phytopathology, 1954, **44**: 39-42, bibl. 26, illus.

A disease complex in field-grown column stocks caused severe losses in the winter of 1952-53 in coastal southern California, in some areas destroying half of the crop. The sequence initiated with a leaf tip burn, fairly common on stocks in the area, caused by soluble salts accumulated through evaporation of guttation drops. These necrotic tips of young apical leaves provided favourable infection courts for *Botrytis cinerea* under cool moist conditions, and the fungus then advanced into the main stem, destroying the raceme of buds or flowers. This leaf and flower decay can be minimized by applications of fungicides, but these may be discontinued after flowers begin to open since leaves are not then susceptible. Continued spraying until flowers were cut caused premature withering and ageing of the petals, particularly when applied during moist weather that retarded drying. Botrytis produced severe losses when such cut flowers were shipped or stored. Losses may be minimized by applications of fungicidal sprays at intervals until flowers begin to show color, but not after that time. [Authors' summary.]—Univ. Calif., Los Angeles, and Soil Plant Lab., Orange.

2954. Böhm, O.
Das Schadauftreten der Veilchenblattrollmücke (*Dasyneura affinis* Kieff.) in Österreich und die Bekämpfungsmöglichkeiten mit synthetischen Insektiziden. **(The violet leaf midge as a pest in Austria and its control by synthetic insecticides.)** [English summary ¼ p.]
PflSch. Ber. Wien, 1954, **12**: 41-53, bibl. 13, illus.
Baas, J.
Das Auftreten der Veilchengallmücke in Hessen-Nassau in den Jahren 1951 und 1952. **(Incidence of violet leaf midge in Hesse-Nassau in 1951 and 1952.**
Anz. Schädlingsk, 1953, **26**: 113-18, bibl. 19, from abstr. in *Z. PflKrankh.*, 1954, **61**: 91-2.

In recent years *Dasyneura affinis* has become a troublesome pest of wild and garden violets in eastern Austria. Two sprays with DDT, phosphoric acid ester or systemic insecticides gave satisfactory control, especially if the applications were timed to coincide with the periods of mass flight in each generation. The two latter types of chemical proved active also against newly-hatched larvae. Treatment by watering the plants was effective only in the case of Pestox III H. Collecting the galls by hand at regular intervals appears to be the cheapest method of control. Biological observations are recorded.

In the second article its life and history and control with DDT are discussed. [See also *H.A.*, 23: 3327.]

Bulbs, tubers, etc.

(*See also* 2643, 3011i, j, m, q, 3271.)

2955. Carra, P.
Plantes bulbeuses. **(Bulbous plants [in Algeria].)**
Rev. hort. Algér., 1954, **58**: 6-11, 74-81.

The North African climate is characterized by hot, dry summers and cool, rainy winters. Thus Algeria suits to perfection the summer-dormant group of bulbous plants which, in general, require no irrigation and little care, and are easy to grow and long-lived. The hardier members of this group are *Amaryllis*, *Antholyza*, *Freesia*, *Iris*, lily, *Narcissus*, *Scilla maritima*, tulips and *Zantedeschia*. The intermediate group, which begins growth about January and becomes dormant about July, requires watering towards the end of its growing season and needs more care than the first group. Its hardier members are *Alstroemeria*, *Gladiolus* and *Watsonia*. The winter-dormant group requires irrigation and careful culture; its hardier members are *Canna*, *Dahlia* and tuberose. Short general cultural instructions are given, together with an annotated cultural calendar for 35 species.

2956. Doorenbos, J.
Notes on the history of bulb breeding in the Netherlands.
Euphytica, 1954, **3**: 1-11, bibl. 9, illus.

A historical review is given of the breeding in Holland of tulips, hyacinths and narcissus. Beauty is the first requirement and is followed by physiological characters such as easy propagation, good growth, and suitability for early forcing. The merits of a plant for garden decoration take third place. The number of varieties that can meet these requirements is very small; but since the demand is for the best in great quantities, this small group accounts for the greater proportion of all bulbs grown. It will be very difficult to surpass these varieties, or even to make additions to this group. In hyacinths and daffodils it is particularly difficult to develop breeding schemes, as the leading varieties are mostly heteroploids and polyploids, respectively. Here a breeder's intuition is needed above all things to bring us better varieties. [From author's summary.]

2957. Feinbrun, N.
The genus *Colchicum* of Palestine and neighbouring countries.
Palest. J. Bot. (*J*), 1953, **6**: 71-95, bibl. 20, illus.

The *Colchicum* species found in Palestine, Syria and Lebanon are enumerated and described, with the help of a distribution map.

2958. van Raalte, D.
Enkele moderne inzichten betreffende de cyclamencultuur. **(Some modern aspects of cyclamen culture.)**
Cult. Hand., 1954, **20**: 68-72, bibl. 13, illus.

A brief survey of the history of the genus is followed by notes on the breeding of cyclamens, some new varieties, seed production and compost mixtures.

2959. Maatsch, R., and Rünger, W.
Ein weiterer Beitrag zur Keimung von Cyclamen. **(A further contribution on the germination of cyclamen.*)**
Gartenwelt, 1954, **54**: 88.

Trials with seed of early cyclamen varieties showed that 16–20° C. is the most favourable temperature for germination. Fresh seed gave the highest percentage germination, but 5-year-old seed was almost equally satisfactory.—Tech. Hochschule, Hannover.

2960. (Limasset, P.)
Les maladies à virus du dahlia. **(Virus diseases of dahlia.)**
Jardins Fr., 1954, **8**: 33-43, illus.

Dahlia mosaic, tomato spotted wilt and cucumber mosaic are discussed. Control is by selection of healthy material combined with genetic selection.

2961. Kosugi, K.
Studies on blindness in gladiolus. 1. Effects of daylength upon the flower-bud differentiation and flower opening in gladiolus. [Japanese, with English summary.]
Tech. Bull. Kagawa agric. Coll., 1953, **5**: 137-43, bibl. 10, illus.

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* See also *H.A.*, 24: 659.

Experiments were made on the influence of day-length on blindness in gladiolus using supplementary light and artificial shading. The flower bud apparently differentiates as the stem elongates regardless of day-length; but the flower often aborts at various stages before the formation of ovules and pollen, when the day is short, which may be due to low light intensity. Lengthening the day with artificial light in the winter months increased flower production. The response to day-length differed with varieties, Kunder'd White being influenced more than Hector by short-day conditions.

2962. Fink, H. C.
Topple, a new disease of gladiolus in western North Carolina.
Plant Dis. Reptr, 1953, **37**: 285-6, illus.

During 1952 a high proportion of gladiolus spikes of several varieties grown in North Carolina broke and toppled over after, but never before, they had been harvested. Spraying plants with 2% calcium nitrate at 54 gal. per acre reduced the percentage of spikes affected from 67 to 18·7. Ground application of 4 forms of calcium had little or no effect. Further tests are being made to determine if calcium deficiency is responsible for the disorder.

2963. Beijer, J. J.
Experiments on the retardation of Dutch irises.
Acta Bot. Neerland, 1952, **1**: 268-86, bibl. 7, illus., reprinted as *Meded. Lab. Bloemboll. Lisse* **98.**

It is possible to retard growth of Dutch iris bulbs for 1 year by storage at a constant temperature of 25·5° C., as soon as possible after lifting and cleaning. A better quality flower can be obtained by lowering the storage temperature to 17° C. for 1 month before planting out. Bulbs retarded in this way can be sent to the Southern Hemisphere at a recommended temperature during shipment of +1° C.

2964. Anon.
Temperature and light intensity during forcing of Croft lilies.
Ohio Flor. Ass. Bull., 1953, No. 291, p. 2, from abstr. in *N.Y. St. Flower Grs' Bull.*, 1954, No. 102, p. 8.

No differences in time of flowering occurred between lily bulbs held at 50° F. from 19 November to 2 February, bulbs held at 60° F. from 17 December to 11 April, and bulbs held at 60° F. from 17 December to 1 February and thereafter at 70° F. With bulbs held continuously at 60° F. shade delayed flowering, but shade had no effect on time of blooming at the other temperatures. Shade reduced the percentage of saleable blooms and increased height.

2965. Bald, J. G.
Check rhizoctonia disease of lilies.
Alameda and San Mateo Counties Flower Notes Bull., 1954, No. 13, pp. 1-2, from abstr. in *N.Y. St. Flower Grs' Bull.*, 1954, No. 102, p. 8.

Rhizoctonia rot of lily bulb scales was controlled by soaking bulbs for ½ hr. in 2 qt. lysol plus 2 lb. fermate per 100 gal. water followed by planting in sterilized soil.

2966. Bensa, S.
Nerine. (**Nerines.**)
Riv. Ortoflorofruttic. ital., 1954, **38**: 101-7, illus.

Notes are given on the cultivation of *Nerine flexuosa sandersonii*, *N. undulata* and *N. sarniensis* grown at Sanremo and on cultural practices on the Italian Riviera.—Staz. sper. Floric., Sanremo.

2967. de Mol van Oud Loosdrecht, W. E.
Die Kohlensäure-Sauerstoff-Druckmethode zur Bekämpfung der Grossen Narzissenfliege (*Lampetia equestris* F.). (**The control of the Large Narcissus fly by the carbon-dioxide-oxygen-pressure method.**) [English summary ¾ p.]
Z. angew. Ent., 1953, **35**: 319-38, bibl. 10, illus.

It is difficult to kill the grubs of *Lampetia equestris* within the narcissus bulb without injuring the young bud. The author succeeded in evolving a new method for which he took out a patent in the Netherlands, viz. exposure of the bulb to a mixture of 20% CO_2 and 80% O_2 at a pressure of 12 atm. for 24 or 48 hours. The 24-hour treatment gave satisfactory results and the 48-hour treatment achieved a 100% kill of all stages of larval development. In preliminary trials some measure of success was obtained with ultra-short electromagnetic waves (140 and 60 cm.). The application of X-rays was not found promising.

2968. Stuart, N. W., and Gould, C. J.
New USDA tests improve outlook for tulip forcers; dry storage "conditioning" cuts cost, aids flowering.
Flor. Exch., 1953, **121** (22): 14-15, illus.

Data are given on 3 years' forcing experiments. The results obtained in 1952/53 show that tulip bulbs, variety William Pitt, stored for 6 weeks at 40° and 50° F. followed by 4–6 weeks at 50° F. and then forced as soon as planted, performed nearly as well as those planted and held for 4–6 weeks at 50° F. for rooting. The initial precooling at 40° F. resulted in the production of longer stems and earlier flowering than similar storage at 50° F. Forcing tulips immediately after planting, i.e. applying the "conditioning temperature" of 50° F. to dry, and not, as is customary, to rooting bulbs, appears promising, but further tests will be made before changes in practice are recommended.

2969. de Mol van Oud Loosdrecht, W. E.
Die Röntgenbestrahlung von Tulpenzwiebeln und ihr modifizierender Einfluss auf die schon vorhandenen Organe sowie auf diejenigen, welche noch nicht geformt sind. (**The application of X-rays to tulip bulbs and their modifying effect on organs already existing and still to be formed.**)
Angew. Bot., 1953, **27**: 143-4.

The modifications induced in tulips by X-ray applications to the bulbs were in many cases still apparent 2 years after treatment.

2970. Kassanis, B.
Tobacco necrosis viruses affecting tulips.
Plant Path., 1954, **3**: 26-9, bibl. 7.

A lethal disease of forced tulips caused by tobacco necrosis viruses was reported in 1949 [see *H.A.*, 19.

2374]. The present paper reports further transmission tests and observations on the occurrence of the disease in England. Differences in varietal susceptibility were confirmed. The origin of natural outbreaks remains unestablished but the evidence suggests that, in the case of badly diseased plants, virus infection occurs in the preceding year and persists in the bulbs during the dormant phase.

Lawns.

(*See also* 2924, 3277.)

2971. Musser, H. B.
The new lawn grasses; their value in lawn seed mixtures.
Seed World, 1954, **74** (1): 8, 40-3, illus.

An evaluation of the performance of some new grasses recently developed in the United States.

2972. Stoutemyer, V. T.
Plugs to change turf.
Calif. Agric., 1954, **8** (2): 5-6, illus.

Plugs of sod, 4 inches in diameter and 1½ inches thick of U-3 Bermuda grass were inserted into established turf of common Bermuda grass. Competition from the established turf was most effectively overcome by spraying it beforehand with maleic hydrazide, causing temporary growth inhibition, and placing organic fertilizers in the holes before setting the plugs.

2973. Gausman, H. W., and Cowley, W. R.
Chlorosis of St. Augustine grass.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 67-8, bibl. 2, illus.

The provision of ample moisture and nitrogenous fertilizers usually corrects summer chlorosis of St. Augustine grass in lawns and golf courses in the Lower Rio Grande Valley. Autumn and spring chlorosis can be completely cleared in 5 days by applying 0·5–1·0% ferrous sulphate solutions (preferably with added detergent) at 100–200 gal. per acre.

2974. Escritt, J. R.
Grass growth stunting with maleic hydrazide.
J. Sports Turf Res. Inst., 1953, **8**: 269-73.

On regularly mown turf maleic hydrazide caused considerable scorching and subsequent growth was poor. On irregularly mown turf its use may have economic advantages.

2975. Smith, J. D.
Corticium disease.
J. Sports Turf Res. Inst., 1953, **8**: 253-8.

Experiments were made with several fungicides against corticium disease of turf. Malachite green/bordeaux mixture applied 3 times at 10-day intervals gave effective control; tersan 75 and merfusan were also effective.

2976. Smith, J. D.
Fungi and turf diseases. 3. Fusarium patch disease.
J. Sports Turf Res. Inst., 1953, **8**: 230-52, bibl. 17.

Fusarium nivale causes fusarium patch disease in Britain; a description of the fungus and symptoms it causes is given. Inorganic mercurials are the most efficient fungicides for its control.

Aquatics.

2977. Nisikado, Y., and Watanabe, K.
On the rhizome rot of lotus, *Nelumbo nucifera* Gaertn., caused by a new fusarium, *F. bulbigenum* Wr. *nelumbicolum* Nis. et Wat.
Ber. Ōhara Inst. landw. Forsch., 1953, **10**: 1-8, illus.

Owing to rhizome rot, the symptoms of which are described and illustrated, lotus production in Japan has dropped considerably in recent years. *Bacillus nelumbii* and a *Fusarium* sp., which was identified as *F. bulbigenum* var. *nelumbicolum*, were isolated from affected plants; the former proved only slightly pathogenic, while the latter showed a high degree of pathogenicity. The disease appears from early July onwards and seems to be associated with iron deficiency and light, sandy soils.

Roses.

(*See also* 3011a.)

2978. Rowley, G. D.
Germination in *Rosa*.
A.R. John Innes hort. Instn 1953, 1954, pp. 27-8.

Experiments were started in 1948 to hasten after-ripening in seeds of *Rosa canina*, and thus encourage germination the first spring. The following routine gives good results: the seeds are harvested as soon as they are ripe, cleaned, and stratified in tall pots of vermiculite. These are placed in a warm glasshouse for 2 months and then transferred to a refrigerator at −2° to 0°C. for a further 2 months. The seed is finally sifted out and sown in the normal way. The pots must never be allowed to dry out completely.

2979. Buck, G. J.
The histological development of the bud graft union in roses.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 497-502, bibl. 10.

This study describing the histology of bud union confirms and augments the observations of experienced horticulturists on the visible indications of success in bud grafting roses.

2980. Owen, O., and Massey, D. M.
Lime-induced manganese deficiency in glasshouse roses.
Plant and Soil, 1953, **5**: 81-6, bibl. 3, illus.

A manganese deficiency in roses is indicated by leaf chlorosis; interveinal areas become yellow and leaf size is reduced but there is no necrosis. The chlorosis has appeared in glasshouses on the varieties Lady Sylvia, Autumn, Talisman, Roselandia and Richmond. The application of elementary sulphur to the soil effectively corrected the deficiency. [See also *H.A.*, 23: 2111.]

2981. Fronmuller, W. A., and Pridham, A. M. S.
An anatomical study of the abscission zone of *Rosa dilecta* Rehr., variety Better Times, as affected by the defoliant disodium 3,6-endoxohexahydrophthalate.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 281-8, bibl. 12.

The oldest leaves were the first to defoliate when plants were treated with endothal. Some leaflets were defoliated within 24 hours following applications of endothal. Generally 3 to 5 days were required for both leaf and leaflet defoliation. Yellowing of the petiolule or petiole indicates the approximate time starch begins to disappear from the abscission zone. The presence of callus cells on the wound surfaces indicates that the process of defoliation is between living cells. The first manifestation of complete cell separation is in the collenchyma of the axil. Culmination of the process is reached by the rupturing of the protoxylem and the separation of the outer parenchyma and epidermis in the area of the notch. Two methods of cell separation were apparent: (1) Separation by chemical dissolution of the compound middle lamellae only. This method of cell separation was found in normally abscissing petiolules and petioles and in parenchymatous cells of the separation layer in the treated plants. (2) Separation by complete dissolution of the cell walls. This method was found in the collenchyma cells of the axil and in some parenchyma adjacent to these cells. In normal abscission the collenchyma wedge, unlike that of treated material, showed no indication of being completely involved in the process of abscission. Separation took place with or without the presence of a well developed separation layer in treated material. The separation layer is present in normally abscissing leaves. [Authors' summary.]—Cornell Univ., N.Y.

2982. Baker, K. F.
Chalaropsis root rot of rose.
Plant Dis. Reptr, 1953, **37**: 430-3, bibl. 10.

Black mould, caused by the weak parasite, *Chalaropsis thielavioides*, caused a root decay of glasshouse roses in southern California. Investigations indicated that losses due to the disease were caused mainly by faulty handling, notably prolonged storage of plants in wet moss followed by excessive watering after planting. The provision of relatively dry conditions resulted in commercial recovery. Attempts to control the fungus by heat treatment were unsuccessful.

2983. Schweiger, H.
Otiorrhynchus (*Arammichnus*) *ligustici* L. als Rosenschädling. (***Otiorrhynchus ligustici*** **as a pest of roses.**)
Beitr. Ent., 1953, **3**: 337-42, bibl. 8.

In April 1952 a mass infestation of *Otiorrhynchus ligustici* occurred in a Vienna nursery, causing severe damage to the foliage and buds of budded roses. DDT proved useless, but collecting by hand and trapping in 50 cm. holes and then squashing proved successful. It is estimated that 700,000–800,000 beetles were killed in an area of less than ¼ hectare. In certain years *O. crataegi* became a pest of lilac in the neighbourhood of Vienna.

Other trees and shrubs.

(*See also* 3011b, e, f, l, m, n, o, t, y.)

2984. Andronov, N. M.
Observations on the growth and development of woody plants. [Russian.]
Agrobiologija, 1953, No. 6, pp. 138-41, illus.

Woody plants of many species, including *Catalpa bungei*, *Aralia californica*, *Laburnum anagyroides*, *Morus alba* and *Acer pseudosieboldianum*, severely frost-damaged in their youth in Leningrad, later developed frost resistance, grew to normal size and began to produce fruit. The progeny of such plants usually shows increasing frost resistance.

2985. Freeman, J. A.
Chemical growth control of hedges.
Rep. Agassiz Domin. exp. Farm, 1948-52, 1954, p. 30, illus.

In preliminary tests the growth of *Salix acutifolia* and *Rhamnus cathartica* was satisfactorily retarded for several months with a spray application of 0·1% maleic hydrazide. *Ligustrum vulgare* required a concentration of at least 1·0% maleic hydrazide to give satisfactory results.

2986. Gesell, S. G.
Insect pests of deciduous shade trees and their control.
Circ. Pa. agric. Ext. Serv. **427**, 1954, pp. 29, illus.

A detailed survey of the pests attacking shade trees in Pennsylvania is given, with measures to be taken for their control. General tree feeders are treated first, and then each tree genus and their most important pests. Finally notes are given on insecticides and their use.

2987. Silberschmidt, K.
Experimental and spontaneous transmission of "infectious chlorosis" of Malvaceae.
Proc. 7th int. bot. Congr. 1950, 1953, p. 718.

Infectious chlorosis of Malvaceae, or *Abutilon* mosaic, is transmitted by a white fly (*Bemisia tabaci*). Experiments have shown that this vector can transmit the disease to *Abutilon theophrasti*, and *Phenax sonneratii* (Urticaceae) which is a natural host in São Paulo.

2988. Richardson, S. D.
Root growth of _Acer pseudoplatanus_ L. in relation to grass cover and nitrogen deficiency.
Meded. LandbHoogesch, Wageningen, 1953, **53** (4): 75-97, bibl. 20, illus.

Studies were made on the root growth of sycamore seedlings (*Acer pseudoplatanus* L.) growing in a root observation chamber. The presence of grass (*Lolium perenne*) depressed root growth rate, shortened the active growth period, reduced the root hair density and restricted both rooting depth and lateral spread of sycamore roots. A deficiency of N reduced the size and growth of sycamore roots, but increased the elongation of grass roots. Active growth of grass roots started some 3 weeks earlier in the spring and was more rapid than that of sycamore roots. The absorbing surface of grass roots was greater than that of sycamore roots in the same volume of soil. Both N deficiency and grass increase the ratio of root dry weight to shoot dry weight in sycamore.

2989. Seeley, J. G.
Chelated iron—what is it?
Pa Flower Grs' Bull., 1953, No. 351, pp. 1, 4, from abstr. in *N.Y. St. Flower Grs' Bull.*, 1954, No. 102, pp. 7-8.

Single applications of 2 commercial forms of chelated iron to an alkaline soil successfully cleared chlorosis from azaleas and gardenias, whereas a soil application of ferrous sulphate and foliage applications of chelated iron were ineffective.

2990. Ahrendt, L. W. A.
On the relationship of *Berberis prattii* and *B. polyantha.*
J. roy. hort. Soc., 1954, **79**: 189-94, bibl. 6.

There is some confusion in nurserymen's catalogues over *Berberis polyantha.* Most of the plants so called are of another species, *B. prattii*, but there are also many variants of *B. polyantha*, which hybridizes freely with related species.

2991. Plakidas, A. G.
Transmission of leaf and flower variegation in camellias by grafting.
Phytopathology, 1954, **44**: 14-18, bibl. 14, illus.

Leaf and flower variegation in camellias was transmitted through grafting, indicating that this condition is due to an infectious agent, presumably a virus, and not a genetic character or a vegetative mutation as popularly believed. [From author's summary.]—Louisiana St. Univ., Baton Rouge.

2992. Paclt, J.
Synopsis of the genus *Catalpa* (Bignoniaceae). Part VII (Addenda 2)*.
Phytopath. Z., 1954, **21**: 329-32, bibl. 5, illus.

An illustrated description is given of *Tubercularia* wilt of catalpas caused by *T. confluens* which destroys the wood of living trees.—Forest Products Res. Inst., Bratislava, Czechoslovakia.

2993. Cornuz, L.
Le greffage en fente des clématites à grandes fleurs. (**Cleft grafting large-flowered clematis.**)
Rev. hort. Suisse, 1954, **27**: 115-17, illus.

At Geneva grafting experiments were made with 4 clematis varieties, using woody scions. The stocks were 2-year-old seedlings of *Clematis paniculata* and *vitalba.* Grafting was done between 20 and 23 December; and the plants were then potted and held in a greenhouse at 20° C. On 20 January after some hardening off, the plants were staked and transferred to a cool house. Among the 4 varieties Ville de Lyon gave 97% success, Nelly Moser 35%, Perle d'Azur 72%, and *C. montana rubens grandiflora* 85%.

2994. Bing, A.
Conifers are very sensitive to atomic radiation.
Bull. N.Y. St. Flower Grs, 1954, No. 101, p. 12.

Various plants were used to determine tolerance to atomic radiation. Conifers were shown to be far more sensitive than herbaceous or broad-leaved woody plants.

2995. Torgeson, D. C.
Root rot of Lawson cypress and other ornamentals caused by *Phytophthora cinnamomi.*
Contr. Boyce Thomson Inst., 1954, **17**: 359-73, bibl. 25, illus.

In Oregon, *Phytophthora cinnamomi* was found to be the cause of root rot in *Chamaecyparis lawsoniana* vars. *allumi* and *elwoodi*, *Taxus baccata*, *T. baccata* var. *stricta*, *T. cuspidata*, *Erica carnea* and *Calluna vulgaris* vars. *alba* and *carnea.* Soils of a medium texture were more suitable for the development and spread of the root rot than lighter or heavier soils, and disease development was favoured by a high soil moisture level. Most host infection probably takes place in late spring and early summer. Fumigation does not seem to be a practicable control method, as *Phytophthora cinnamomi* may occur in the soil to a depth of at least 2·4 ft.

2996. Fuller, C. E. K., and Newhook, F. J.
A report on cypress canker in New Zealand.
N.Z. J. Agric., 1954, **88**: 211-20, bibl. 7, illus.

Many shelter belts in New Zealand consisting of *Chaemacyparis lawsoniana*, *Cupressus macrocarpa* and other members of the cupressus family, are being affected by cypress canker (*Monochaetia unicornis*), the symptoms of which are described. Control methods are suggested but planting disease-resistant varieties, some of which are listed, is recommended as a wiser solution.

2997. Smith, B. C., and Chadwick, L. C.
Studies of the germination of seed of *Cotoneaster zabeli.*
Proc. Amer. Soc. hort. Sci., 1953, **62**: 503-5, bibl. 2.

A temperature of 51° F. for 8 weeks proved best for stratifying seeds of *C. zabeli* previously scarified by soaking for 18 minutes in concentrated sulphuric acid at 72° F. Subsequently the seeds were soaked for 48 hours in water at 70° F. and 75° F. and the embryos excised and cultured. Seedling production amounted to 98% in 56 days compared with 4 months reported by other workers for seed not so treated.

2998. Pridham, A. M. S., and Hsu, R.
Temperatures at which defoliated twigs of *Forsythia intermedia spectabilis* show cold injury.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 289-92.

Resistance of forsythia twigs to cold injury is greater in October than in July. Twigs subjected to 18° F. in July were killed but in October both untreated controls and twigs defoliated in July were uninjured following test temperatures of 17° and 12° F. The method of defoliation, i.e. by hand or by Niagarathal, had no effect on mortality. Dormancy-inducing treatments with maleic hydrazide and α-NAA did not interfere with the defoliant action of Niagarathal but did result in considerable mortality when twigs were submitted to 17° and 12° F. in October. Dormancy-inducing treatments applied prior to defoliation did not always retard bud break but did show trends correlated with the amount of growth regulator applied. [From authors' summary.]—Cornell Univ., N.Y.

2999. Neal, O. M.
Deciduous holly, a new ornamental crop.
A.R. W. Va agric. Exp. Stat. 1952-1953, issued as *Science Serves your Farm, Bull.* **363**, Part 2, 1953, pp. 5, 11.

Recent studies on Virginia winterberry, *Ilex verticillata*, shows its promise as a florists' crop from October to

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* For Part VI (Addenda 1) see *Phyton*, 1953 5: 118-27.

December. Plants of both sexes should be planted in a frost-free site, to obtain maximum cropping.

3000. Shanks, J. B., and Link, C. B.
Fertilization during the growing and forcing periods on growth and flowering of hydrangeas.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 471-80, bibl. 6.

On the basis of further experiments [see *H.A.*, 23: 3381] on the fertilizer requirements of hydrangeas, it is recommended to use a 30-10-10 mixture or a commencial fertilizer of similar composition for both the summer growing period and the forcing period. The material should be applied in liquid form, at 1 oz. in 2 gal. of water, every 2–4 weeks of the growing, and every 10–14 days of the forcing, period.

3001. Garren, K. H.
Stem nematode disease of greenhouse hydrangeas.
Plant Dis. Reptr, 1953, **37**: 340-2, bibl. 5, illus.

The symptoms are described and illustrated of a disease of hydrangeas associated with the presence of nematodes of the genus *Ditylenchus*. Infected plants may be kept alive for at least 2 years but are worthless. Experience indicates that control is best obtained by destruction of infected plants, soil sterilization and other sanitation measures.

3002. Mulder, M.
Cueillette pneumatique des fleurs de jasmin.
(Suction harvesting of jasmine flowers.)
Rev. gén. Caoutch., 1954, **31**: 269, illus.

The apparatus consists of an electrically operated suction pump and container carried on the back. A picking unit at the end of a rubber tube cuts the flowers at the base of the calyx and sucks them into the container. With slight modifications the apparatus could be used for other flowers.

3003. Bergann, F.
Zur Frage der Behandlung hartschaliger Leguminosen-Samen. **(The treatment of leguminous seed with a hard testa.)**
Arch. Gartenb., 1953, **1**: 469-73, bibl. 10.

A few minutes' grinding of laburnum and *Robinia* seed in fine quartz sand caused sufficient mechanical injury to the testa to permit imbibition of water. The treatment raised the germination capacity of the seed to 95%.—Karl-Marx Univ., Leipzig.

3004. Palmer, C. W.
The use of plastic film in grafting.
Gdnrs' Chron., 1954, **135**: 111.

Grafts made between *Laburnum vulgare* (stock) and *Cytisus praecox* (scion) were surrounded by sphagnum moss, and the whole tightly secured in a plastic film. After 16 days the unions were well developed and the plastic could be removed.

3005. Pridham, A. M. S., and Hsu, R.
Defoliation response of *Ligustrum ovalifolium* to 3,6-endoxohexahydrophthalate formulations.
Proc. 7th annu. Mtg N.E. Weed Control Conf. 1953, New York, pp. 341-5.

Temperatures below 60° F. reduce the effectiveness of all defoliants studied to date [see also *H.A.*, 23: 1069]. Disodium 3,6-endoxohexahydrophthalate (Niagarathal) was fairly effective at 40° and 50° F., but at these low temperatures it should be applied in dilutions higher than 1: 250, though not more than 1: 40. Ascorbic acid and methyl or ethyl alcohol used in conjunction with Niagarathal showed promise of defoliant activation at low temperatures. When dormancy-inducing growth regulators at effective rates were applied before the defoliants, defoliation was usually retarded.—Cornell Univ., N.Y.

3006. Kofranek, A. M., and Sciaroni, R. H.
Poinsettia bud initiation dates.
Calif. Agric., 1954, **8** (1): 9, illus.

In the San Francisco Bay area, poinsettias were found to initiate flowers in the short days of late September and early October. Average bud initiation dates differ with varieties, and light intensity also seems to have some effect. Provision of other favourable cultural conditions, at the time of initiation, will give a more uniform bud set.

3007. Carpenter, W. J.
Delaying poinsettia flowering.
Kans. St. Coll. Flor. Bull., 1954, No. 1, p. 2, from abstr. in *N.Y. St. Flower Grs' Bull.*, 1954, No. 102, p. 8.

Eight varieties of poinsettia given artificial light from 5 to 8 p.m. from 20 September to 1 October flowered from 20 December, whereas plants given normal day-length flowered from 10 December. Pinching on 25 August delayed flowering by 1 week and on 1 September by 2 weeks.

3008. Shanks, J. B., and Keller, J. R.
Low pH joins sanitation measures in fight on poinsettia root rot.
Flor. Exch., 1954, **122** (17): 14, 56, bibl. 2, illus.

The experiments described indicate that *Thielaviopsis* is the real cause of root rot in poinsettia but other fungi, *Rhizoctonia* and *Pythium*, present tend to increase the damage. Apart from the accepted practices of sterilizing soil, pots, benches, tools, etc., fungicide application and high temperatures, growing poinsettias in acid soil is shown to give very good control of root rot. In a test with 11 varieties grown at 3 pH levels, the roots and leaves of most varieties were lost at pH 6·3 and 7·3, but no damage occurred at pH 4·8. Varieties partially resistant to the disease are noted and a method of acidifying soil with sulphur is outlined.

3009. Sterling, C.
Vascularization of normal and foliate carpels of *Prunus laurocerasus*.
Bot. Gaz., 1953, **115**: 196-9, bibl. 6.

Normal and teratological carpels of *Prunus laurocerasus* L. are compared with each other and with the foliage leaf. The vascular structure of both types of carpels is shown to be uniquely different from that of the foliage leaf, in that the carpel has two extra bundles (either ovular or marginal) which are lacking in the vegetative leaf. These bundles, in addition to the dorsal bundle and the two wing bundles, give the carpel a basic five-trace structure. The extent of presumptive pit formation is related to the development of ovular tissue in the carpel. [Author's summary.]

3010. Husch, B.
The regeneration of *Prunus serotina* in north-western Pennsylvania following cutting.
Ecology, 1954, **35**: 11-17, bibl. 4.

In Pennsylvania, natural stands of the black cherry, *Prunus serotina*, showed best growth and reproduction in open areas, and under light shade. Promising methods of regeneration are indicated.

Noted.

3011.

a Baker, K. F.
Recent epidemics of downy mildew of rose.
Plant Dis. Reptr, 1953, **37**: 331-9, bibl. 57.
The history and control of *Peronospora sparsa* reviewed.

b Baxter, L. W., and Plakidas, A. G.
Dieback and canker of camellias caused by *Glomerella cingulata.*
Phytopathology, 1954, **44**: 129-33, bibl. 10, illus.
Abstracted *Ibid.*, 43: 404; *H.A.*, 24: 714.

c Brierley, P.
Some experimental hosts of the chrysanthemum stunt virus.
Plant Dis. Reptr, 1953, **37**: 343-5, bibl. 4.

d Brierley, P., and Smith, F. F.
Noordam's B virus of chrysanthemum detected in the United States.
Plant Dis. Reptr, 1953, **37**: 280-3, bibl. 7.
Compared with tomato aspermy virus in transmission tests.

e Brink, V. C.
Survival of plants under flood in the Lower Fraser River Valley, British Columbia.
Ecology, 1954, **35**: 94-5, bibl. 5.
Effects of flooding on various ornamental trees.

f Cox, R. S.
Some common diseases of flowering dogwood.
Circ. Del. agric. Exp. Stat. **27,** 1954, pp. 8, bibl. 3, illus.
See *H.A.*, 23: 3379.

g Datta, R. M.
Fasciation in the peduncle and the inflorescence of *Gaillardia pulchella* Feug. (syn. *bicolor*) var. *lorenziana.*
Sci. and Cult., 1954, **19**: 403-4, bibl. 5, illus.

h Dewey, A. W.
The floricultural industry of Connecticut.
Inf. Storrs agric. Exp. Stat. **52,** 1953, pp. 8.
Economics of production and market classes of products.

i Doucette, C. F.
***Amphicyrta chrysomelina* as a pest of lilies.**
J. econ. Ent., 1953, **46**: 914.
Control in Oregon by DDT and BHC.

j Gaarder, P.
Dahlia sortskritikk fra sommeren 1953. **(Dahlia variety trials in summer 1953.)**
Gartneryrket, 1954, **44**: 207-10.

k Horn, W.
Polyploidie und Zierpflanzenzüchtung. **(Polyploidy and the breeding of ornamental plants.)**
Gartenwelt, 1954, **54**: 161-3, bibl. 12.
Chrysanthemum, primula, snapdragon and others.

l Kemmerer, H. R.
Pruning narrowleaf evergreens.
Circ. Ill. agric. Ext. Serv. **708,** 1953, pp. 8, illus.
An illustrated account of pruning conifers.

m Klougart, A.
13. Beretning fra Faellesudvalget for Bedømmelse og Prøvedyrkning af Prydplanter. **(13th Report of the Committee for Testing Ornamental Plants.)**
Årbog Gartneri 1953, 1954, **35**: 177-88, illus.
Variety trials with cyclamen, dahlia and paeony.

n Lakon, G., and Bulat, H.
Die Feststellung der Keimfähigkeit der Laubholzsamen nach dem topographischen Tetrazolium-Verfahren. II. Die Oleaceen. **(Seed testing in broad-leaved woody plants by the topographic tetrazolium method. II. Oleaceae.)**
Saatgut-Wirtsch., 1954, **6**: 40-2, bibl. 1, illus.

o Lee, R. E.
Peony culture.
Cornell ext. Bull. **893,** 1953, pp. 4.

p Lee, R. E.
The culture of garden chrysanthemums.
Cornell ext. Bull. **894,** 1953, pp. 4.

q MacDaniels, L. H.
The culture of iris.
Cornell ext. Bull. **895,** 1953, pp. 4.

r Martin, E. D.
The importance of flower seed production in California.
Seed World, 1954, **74** (4): 12, 40-1.

s Miller, P. R.
Detection of virus B of chrysanthemum in the United States.
FAO Plant Prot. Bull., 1954, **2**: 56-9.

t Ministry of Agriculture, London.
Rhododendron bug.
Adv. Leafl. Minist. Agric. Lond. **206,** revised 1953, pp. 4, illus.
Stephanitis rhododendri and its control.

u Murakishi, H. H.
Diamond spot, a new disease of *Spathoglottis* orchids.
Bull. Pacific Orchid Soc. Hawaii, 1952, **10**: 14-16, from abstr. in *Z. PflKrankh.*, 1954, **61**: 207.
Virus symptoms described.

v PAISLEY, K.
Fertilisers for horticultural crops. 16. Carnations.
Fert. Feed. St. J., 1953, **39**: 803-5, 851-2, bibls few in text.
A review relating to conventional and soilless culture.

w PONNIAH, L., AND SESHADRI, T. R.
A survey of anthocyanins from Indian sources: Part I.
J. sci. industr. Res., India, 1953, **12B**: 605-10, bibl. 8.
Determined in Indian flowers by chromatographic methods.

x RAJASEKHARA MUDALIAR, C., AND RAMAKRISHNAN, V.
Flowering annuals for plains of South India.
S. Indian Hort., 1954, **1**: 129-36.

y ZIMMERMAN, P. W.
Hardy camellias in the vicinity of New York city.
Amer. Camellia Yearb., 1953, **2**: 313-19, reprinted as *Prof. Pap. Boyce Thompson Inst.*, 1953, **2**: 97-103, bibl. 4.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

(*See also* 2120, 2124, 2928.)

Avocadoes.

(*See also* 3018, 3100b, v, w, 3270e.)

3012. WINSLOW, M. M., AND ENDERUD, J.
Avocado variety trials.
Citrus Leaves, 1954, **34** (2): 21, and *Calif. Citrogr.*, 1954, **39**: 183.

In California an avocado variety orchard has been established since 1943, and serves as a trial for varieties showing promise of adaptability to inland valleys. Unproductive varieties which have been discarded are Nabal, E28, MacPherson, Karen, Middleton, Gottfried, Leucadia, Henry's Select, Gerkin and Carr. Varieties showing commercial promise are Duke, Clifton, Zutano, Emerald, Hass and Ryan. [See also *H.A.*, 23: 1097.]

3013. TAI, E. A., AND BOLAND, P.
Avocado propagation in Trinidad.
J. agric. Soc. Trin. Tob., 1953, **53**: 496-501, illus.

An account is given of the method in regular use at the St. Augustine Station. It consists of growing avocado seedlings in bamboo joints, applying shield buds taken from selected trees when the seedlings attain a height of about seven inches, and forcing growth of the bud. If the avocado seeds are set in August, budlings can be ready for planting out in the field by the end of the year. Normally, the seeds are collected at the height of the avocado season, in September and October, and the resulting budded plants held over for distribution in the wet season (from May on) of the following year, although they attain a satisfactory size much earlier.

3014. HAAS, A. R. C., AND BRUSCA, J. N.
2,4-D treated avocado plants.
Calif. Agric., 1954, **8** (3): 12-14, illus.

2,4-D added to a nutrient solution stimulated the vegetative growth of rooted avocado cuttings in the greenhouse, and of budded trees growing outdoors. Trials on the use of 2,4-D in grafting are now being made.

3015. MARTIN, J. P., AND BINGHAM, F. T.
Growth of avocado seedlings.
Calif. Agric., 1954, **8** (2): 7, 12.

Avocado seedlings, var. Topa Topa, were planted in Yolo loam soil, containing known amounts of exchangeable Na or K. The seedlings grew best at 4% to 6% exchangeable K, and in soils with a very low Na percentage. Growth was reduced by K at 13% and by exchangeable Na at 4% to 7%; above these levels necrosis appeared. Other plants, tomatoes, barley, vetches, radishes, lettuces, onions, alfalfa and carrots do not show growth reduction until 30% to 40% exchangeable K and 20% to 40% exchangeable Na are present.

3016. DUCHARME, E. P., AND SUIT, R. F.
Nematodes associated with avocado roots in citrus spreading decline areas.
Plant Dis. Reptr, 1953, **37**: 427-8, bibl. 1, illus.

Preliminary studies in Florida indicate that the burrowing nematode, *Radopholus similis*, will attack, and cause a decline in, avocado trees. Areas affected by citrus spreading decline should not, therefore, be planted to avocadoes without proper soil treatment [not specified].

Citrus—general.

(*See also* 2175, 2211, 3100e, j, 3105, 3270e, 3299.)

3017. SKEPPER, A. H., AND DAVISON, J. R.
The citrus industry on the Murrumbidgee Irrigation Area.
Agric. Gaz. N.S.W., 1953, **64**: 652-4, and 1954, **65**: 47-53.

The citrus industry in the M.I.A. suffers from too many uneconomic trees. To keep a farm on a paying basis an average yield of 3 bushels per tree is necessary, and the average yield, from oranges, in this area is 1·83 bushels. The factors limiting production are discussed under the following headings. 1. Land use. 2. Rootstocks. 3. Irrigation and drainage. 4. Farm size and rotational planning. 5. Soil management.

3018. MARLOTH, R. H.
Citrus and subtropical fruit research. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1953.]
Fmg S. Afr., 1954, **29**: 87-90, 104.

Citrus. In a 17-year-old rootstock trial, sweet orange stocks are proving superior to rough lemon for fruit quality. Two promising rootstocks are Sampson tangelo for grapefruit and Empress mandarin for the Tomango (mid-season) orange. Irrigation given regularly from July to April gave the best results. A permanent leguminous cover crop, *Glycina javanica*, gave high yields most economically. *Storage.* For avocadoes a temperature of 47° F. is preferable to 40° F. for the Fuerte variety. *Vegetables.* Work has included tomato fertilizer experiments, breeding and selection and variety experiments.

3019. Camp, A. F.
The citrus industry of Japan.
Citrus Mag., 1954, **16** (8): 20-8, illus.

In Japan citrus is grown commercially in scattered coastal areas, mainly on the south coast of Honshu, and in Shikoku, Kyushu and the small islands of the Inland Sea. Plantations totalled 100,000 acres in 1952; of this, 87% was under Unshiu (Satsuma) and 10% under summer oranges. The chief rootstocks are trifoliate orange and Yuzu (used also for inarching mature trees on trifoliate). Notes are given on cultural practices, manuring, pest control and harvesting. Production was 20 million boxes (each of 83·3 lb.) in 1952. The main Unshiu shipping season is from November to February with a peak in December. A note is given on Yuzu which is considered by Tanaka to be a separate species *Citrus junos*, but by Swingle to be a hybrid between *Citrus ichangensis* Swing. and the sour mandarin.

Citrus—varieties, rootstocks and propagation.

(*See also* 3100g, i, k, t, 3102.)

3020. Tai, E. A.
The citrus investigation programme of the Department of Agriculture [Trinidad].
J. agric. Soc. Trin. Tob., 1953, **53**: 387-96.

Scions. A museum orchard is being established at the Central Experiment Station to supplement that at the St. Augustine Station. The outstanding variety of grapefruit is Marsh Seedless; variations of it under trial are the very late, high-yielding Cecily, and the red-fleshed Ruby. With oranges the ultimate aim is an all-the-year-round season. The present season is covered by Hamlin and Parson Brown in October/December, Pineapple and Jaffa in November/February and the standard Valencia in March/July. An extra late variety, the Lue Gim Gong, and a completely seedless Valencia are undergoing observation. The West Indian is the only satisfactory lime. Experiments are in progress on a withertip-resistant variant of it. Other citrus under observation include mandarins, tangerines, tangelos and other hybrids. *Rootstocks.* Sour orange is a satisfactory stock for all citrus varieties grown in Trinidad but owing to its high susceptibility to quick decline—which has not yet invaded Trinidad—a substitute is being sought. For both grapefruit and oranges 6 rootstocks are being tried, namely, sour orange as standard with sweet orange, rough lemon, Dominica wild grapefruit, Sampson tangelo and Cleopatra mandarin. For limes, bittersweet orange, sweet orange, rough lemon and Dominica wild grapefruit are being tried against seedlings as standard. Other rootstocks under trial are Rangpur lime and Ichang. *Nursery technique.* At St. Augustine the best takes occur when stocks are budded before the bark begins to show striping. *Orchard management.* General notes are given on various aspects.

3021. Davel, H. B.
Transvaal region. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1953.]
Fmg S. Afr., 1954, **29**: 114-18, 104.

The report for 1952/53 of work done at the Agricultural Research Institute, Pretoria, includes investigations into citrus virus diseases; and the establishment of nucellar selections from existing clonal varieties of citrus, which are now degenerating.

3022. Hu, C. C.
A review of literature on citrus nucellar embryony, and some new data on old and young lines of Valencia orange.
Mem. Coll. Agric. nat. Taiwan Univ., 1953, **3**: 20-32, bibl. 19, illus.

After a review of literature on citrus nucellar embryony the author gives an account of a study made by him at the Citrus Experiment Station, University of California, in 1950/51 on the fruit characters of 4 old and 4 young lines of Valencia orange. Fruit size, seed number, rind thickness, core size and juice quality differed between the nucellar and the old lines. [See also *H.A.*, 22: 2933.]

3023. Džorbenadze, A. M.
Vegetative hybrids in citrus. [Russian.]
Agrobiologija, 1953, No. 3, pp. 124-7, illus.

The reciprocal effects of trifoliate rootstocks and citrus scions, in connexion with breeding for frost resistance, are discussed. The examples quoted include an Unshiu mandarin killed back by frost in the winter of 1949/50, but from the root collar of which 3 suckers arose during the 3 following seasons. The first one of these suckers had a hybrid character, the second resembled the mandarin and the third the trifoliate rootstock.

3024. Zorin, F. M.
Some new methods of breeding citrus. [Russian.]
Agrobiologija, 1953, No. 2, pp. 99-104, illus.

At Sočin greater frost resistance in citrus has followed the provision of a supplementary stem usually of the deciduous, trifoliate orange, that is already being used as the rootstock. This is obtained by allowing a trifoliate sucker to grow up to 70–90 cm. and then inarching it to the stem or a skeleton branch of the scion variety. Even under conditions unsuitable for trifoliata, varieties on evergreen rootstocks supplied with a trifoliata seedling have shown improved hardiness and cropping. Notes are also given on methods of hastening fruiting for the trial of new varieties.

3025. Glenn, K.
Valencia rootstock trials.
Calif. Citrogr., 1954, **39**: 176.

In California, in 1945, rootstock trials were laid down using Valencia oranges on sweet orange, sour orange, tangelo, Troyer citrange, trifoliate orange and King mandarin; these were grown on old citrus soil. In addition Valencias on sweet orange and Sampson tangelo were planted on virgin soil. Yields in 1951-1953 were highest on virgin soil, with Troyer citrange giving the best yield in the old soil group.

3026. Mortensen, E.
Citrus rootstocks in the Winter Garden area of Texas.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 13-21, bibl. 9.

Citrus rootstocks trials laid down between 1933 and

1944 inclusive showed that the following gave good yields: (1) for sweet oranges—Rusk and Uvalde citrange, Sacaton citrumelo, trifoliate orange; (2) for satsuma oranges—Carrizo, Uvalde and Cunningham citrange; (3) for grapefruits—sour orange, Carrizo and Rusk citranges and Sacaton citrumelo; (4) for tangelos—Cunningham citrange.

3027. HAAS, A. R. C., AND BRUSCA, J. N.
2,4-D treatment of citrus seed.
Calif. Agric., 1954, **8** (2): 8, 12, illus.

In germination experiments with Koethen sweet orange, the highest percentage germination after 6 weeks was obtained from seeds watered at sowing and twice subsequently with a solution containing 0·0075 p.p.m. 2,4-D; additional tap water was also given. Seeds stored dry overnight before sowing produced no albinos.

3028. HAAS, A. R. C., AND BRUSCA, J. N.
Growth of citrus seedlings.
Calif. Agric., 1954, **8** (4): 7-8, illus.

Soil applications of 2,4-D at various concentrations were given to 8 sets of seedling rootstocks. Results showed that Cleopatra mandarin, Pomeroy trifoliate orange and Troyer citrange were apparently indifferent to the applications; sour orange, sweet orange, rough lemon, Tangelo and grapefruit showed increased height growth at low concentrations, but bushy growth at higher concentrations.

Citrus—cultivation and pruning.

(*See also* 2196, 3100u.)

3029. MARTIN, J. P., AND ERVIN, J. O.
Crop rotation and growth of citrus seedlings.
Citrus Leaves, 1954, **34** (5): 10-11, illus.
Growth of citrus seedlings as influenced by crop rotation.
Calif. Citrogr., 1954, **39**: 222, illus.

In this study, sour orange seedlings were grown in sandy loam for 6 months. Soil from this area, placed in pots, was then subjected to a range of treatments, including the planting of sweet orange seedlings and 25 other crops and dry and moist fallows. The tops were then removed and discarded. The soil and roots, chopped, were mixed and returned to the pots. Three months later another uniform crop of sour orange seedlings was grown in the soil for 8 months. Non-leguminous crops, especially Rhodes grass, had a more favourable effect on the growth of the second batch of sour orange seedlings than did leguminous crops; among the latter the bird's-foot and big trefoils gave the best results.

3030. SINGH, L. B., AND NAURIYAL, J. P.
A preliminary study in cover cropping citrus orchards.
Indian J. Hort., 1953, **10**: 44-8, bibl. 23.

Three green manure crops were tested in an 18-year-old citrus orchard, namely berseem (*Trifolium alexandrinum*), lucerne (*Medicago sativa*) and methi (*Trigonella foenum-graecum*), control plots being clean cultivated. All three crops increased the nitrogen content of the soil. Berseem gave the best results in terms of yield of green matter and added nitrogen, and is recommended as a winter cover crop where irrigation facilities exist.

3031. LA FOLLETTE, J. R., AND TEAGUE, C. P.
Mechanical pruning of orange trees to improve pest control.
Calif. Citrogr., 1954, **39**: 186, 193, bibl. 2, illus.

A tractor-drawn, pruning machine is described, which, by means of rotating saw blades on a boom, will hedge tree rows at the rate of 1 acre per hour, thus making more efficient pest control possible.

3032. OPITZ, K. W.
Pruning to rejuvenate orange trees.
Calif. Citrogr., 1954, **39**: 132-3.

Trials are in progress in California, to determine the effect of "skeletonization" on old orange trees which contain much dead wood but appear to be free from disease. The procedure is to remove all wood of less than ¾ in. in diameter except for small leafy twigs on the larger branches. Pruning was done in 1952 and up to February 1953. At the present time [January 1954?] the pruned trees are carrying larger, greener leaves than unpruned trees and have already recovered sufficiently to carry a good crop.

Citrus—tree composition and nutrition.

(*See also* 2175, 2275, 3100a, q, s.)

3033. MONSELISE, S. P., AND HEYMANN-HERSCHBERG, L.
Influence of exposure and age on dry matter content, area and mineral composition of Shamouti orange leaves.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 67-74, bibl. 12.

The work described shows the effect of age and exposure to sunlight on size, weight and composition of leaves collected from a Shamouti orange grove at Rehovot, Israel. Old leaves had a greater weight and higher dry matter content than young leaves of similar size. The size of leaves of comparable age decreased and their weight per unit area increased with exposure to light. In general, old leaves had lower N and P contents than young leaves. In leaves of comparable age N and P content increased with increasing light intensity, when calculated on the basis of dry weight, fresh weight or leaf area. The mineral content for all light intensities showed the smallest deviation from the average when calculated on a dry weight basis (10–27%) and the greatest when calculated on a leaf area basis (35–55%).

3034. WALLACE, A., NORTH, C. P., AND FROLICH, E.
Interactions of rootstock, soil pH, and nitrogen on the growth and mineral compositions of small lemon trees in a glasshouse.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 75-8, bibl. 8.

Eureka lemon on 5 rootstocks was grown for 15 months at 3 soil pH (5·0, 6·4 and 7·5) and 3 nitrogen levels. The mean dry weights of plants receiving periodic applications of 0·1 g., 0·2 g. and 0·3 g. N per plant were 23 g., 33 g. and 34 g. respectively. At pH 5 they were 18, 28 and 19 g., and at pH 7·5, 26, 37 and 53 g. respectively. Apart from N, P might have influenced plant weights. At pH 5 lemon was largest on trifoliate orange and at pH 7·5 on rough lemon. Lemon on sour orange was small with all treatments, while on sweet orange and grapefruit acid soil tended to reduce size. The mean Fe content in p.p.m. of dry weight of 4-month-old leaves was 109 when on sour orange, 88 on sweet orange, 111 on rough lemon, 70 on grapefruit and 64 on trifoliate orange rootstocks. The mean N concentrations for 4-month-old leaves were 3·03 when on sour orange, 2·22 on sweet orange, 2·16 on rough lemon, 2·34 on grapefruit and 1·65 on trifoliate orange. N content was largely related to plant size, larger plants containing less N per unit of dry weight. The effect of rootstocks on K, Ca and Mg concentrations is also mentioned.

3035. Jones, W. W., and Embleton, T. W.
Nitrogen fertilizer and orange production.
Calif. Citrogr., 1954, **39**: 120, 122.
Nitrogen fertilizers in relation to orange production.
Citrus Leaves, 1954, **34** (2): 10.

The preliminary results of field experiments [not fully described here] on the use of N for oranges in several localities suggest that: (1) seasonal variations in leaf N are such as to limit the use of leaf analysis as a guide to N requirements; (2) there is a critical need for high N at the time of flowering and fruit setting; (3) after fruit has set the leaf-N level appears to have little effect on yield; and (4) annual applications of 2–3 lb. N per tree are in some cases higher than is necessary to maintain yields.

3036. Haas, A. R. C., and Brusca, J. N.
Growth of citrus rootstocks as affected by nutrition.
Citrus Leaves, 1954, **34** (4): 10-11, 26-7, 30, bibl. 3, illus.

In California a series of experiments was conducted on citrus root growth in soil and in sand cultures. With Lisbon lemon on sour orange, the root growth was shown to increase when ammonium, applied as the sulphate, was increased, excessive acidity being neutralized by Ca. Considerably improved root growth occurred when Al in the form of citrate was applied. P_2O_5 in the acid phosphate form improved root growth of Lisbon lemon on sour orange stocks, but at the higher levels tended to encourage small fruits. Valencia oranges on rough lemon rootstocks gave a maximum response to phosphate at 77·5 p.p.m.

3037. Gausman, H. W.
Effects of light duration and hydrogen-ion concentration on the growth, total iron content and phosphorus content of Cleopatra mandarin.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 23-8, bibl. 13.

Cleopatra mandarin is a promising rootstock in the Lower Rio Grande Valley but propagation by seed is sometimes difficult because the seedlings often become chlorotic, particularly on calcareous soils. In the experiment described Cleopatra mandarin seedlings were grown under two light periods of 8 and 16 hours' duration with three treatments of nutrient cultures having initial hydrogen-ion concentrations of a pH of 6, 7, and 8. In general, best growth of the Cleopatras occurred with 16 hours of light and a nutrient solution having an initial pH of 8. The 8-hour light period enhanced the total iron content in the seedling tops compared with the roots, even though chlorosis occurred. Eight hours of light increased the P_2O_5 content of seedling tops approximately twofold over plants which received 16 hours of light. A phosphorus-induced chlorosis is discussed. [Author's summary.]—Texas agric. Exp. Stat., Weslaco.

3038. Cooper, W. C., Peynado, A., and Shull, A. V.
Screening citrus seedlings for tolerance to calcareous soils.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 100-5, bibl. 4.

Only 3 of 61 citrus varieties tested showed iron chlorosis on non-calcareous soil; on calcareous soil 54 showed it. Sweet orange varieties all showed moderate to severe symptoms, some mandarins and mandarin hybrids showed severe symptoms and others none, and trifoliate hybrids showed mild to severe symptoms. The 7 varieties that showed no chlorosis were Suen Kat and Kunembo mandarins, Shekwasha and Calamondin mandarin hybrids, Rangpur lime, sour orange and rough lemon.

3039. Cooper, W. C., and Peynado, A.
Correction of iron chlorosis of young grapefruit trees on Cleopatra mandarin rootstock with chelated iron.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 106-9, bibl. 5, illus.

Chelates of iron with ethylenediamine tetraacetic acid (EDTA), hydroxyethylethylenediamine triacetic acid (EDTA-OH) and diethylenetriamine pentaacetic acid (DTPA) corrected iron chlorosis on small Ruby red grapefruit trees on Cleopatra mandarin rootstock growing in a nursery on slightly calcareous soils. Leaves on some chlorotic trees became green within 8 weeks when trees were supplied with a single soil application of 4 g. of iron chelated with EDTA-OH, 27 g. of iron chelated with EDTA and 68 g. of iron chelated with DTPA. Foliage sprays of iron chelates were not such promising correctives of iron chlorosis as soil applications. Further study is required to develop a practical method of applying these materials to calcareous nursery soils. [From authors' summary.]

3040. Singh, M. P.
Iron deficiency in citrus plants and its control.
Indian J. Hort., 1953, **10**: 56-8, illus.

Among citrus species budded onto jamberi (*Citrus limoni*), Santra (*C. reticulata*) was seen to be the most sensitive to lime-induced chlorosis, and sour lime (*C. aurantifolia*) and Musambi (*C. sinensis*) less so. Diagnostic responses to leaf injection with Fe were obtained.

3041. Connor, J.
Effect of cultural practices on the manganese status of soil and citrus trees under irrigation.
Aust. J. agric. Res., 1954, **5**: 31-8, bibl. 12.

The occurrence of Mn deficiency in citrus on an experimental orchard on light soil in the Murrumbidgee Irrigation Area is reported. There is a relationship between visual symptoms of deficiency and the amount of Mn in the leaf. When leaf Mn falls to 20 p.p.m., 50% of the trees showed visual deficiency symptoms.

Trees on sweet orange stock had less Mn and showed more visual deficiency symptoms than trees on rough lemon stock. A decrease in soil pH consequent on the addition of ammonium sulphate fertilizer led to a graduated increase in exchangeable soil Mn and leaf Mn. Bringing the calcareous subsoil to the surface on making drainage trenches led to acute Mn deficiency. Trees on plots tilled during the summer have greater leaf Mn contents than trees on sod plots or plots not tilled but kept free from weeds by herbicidal sprays, but these cultural treatments do not affect the exchangeable soil Mn. Possible reasons for the differences are discussed. [Authors' summary.]

3042. Jones, W. W., and Cree, C. B.
Navel orange production as influenced by sulfur.
Citrus Leaves, 1954, **34** (4): 8-9.
Navel orange production as influenced by sulfur in the fertilizer program.
Calif. Citrogr., 1954, **39**: 212-14, bibl. 4.

In long-term experiments in California with Washington Navel oranges, soil acidification, obtained by applying sulphur, had no significant effect on fruit yields.

3043. Shaw, E., Menzel, R. G., and Dean, L. A.
Plant uptake of Zn65 from soils and fertilizers in the greenhouse.
Soil Sci., 1954, **77**: 205-14, bibl. 8.

In one of a series of experiments, a comparison was made between the zinc uptake of maize and of orange seedlings; the utilization of zinc from $ZnSO_4$, by both, was very similar.

Citrus—fruit composition.

(*See also* 3100p.)

3044. Batchelor, L. D., and Bitters, W. P.
Juice and citric acid content of three California lemon varieties.
Citrus Leaves, 1954, **34** (3): 12-13, bibl. 3, and *Calif. Citrogr.*, 1954, **39**: 187, bibl. 3.

Fruits of 6 strains of lemon varieties, Eureka (2), Villafranca (1) and Lisbon (3), grown on sweet orange and sour orange rootstocks were picked at the "silver" stage of maturity. Analyses of their juice and citric acid contents were made before and after 38 days storage at 50–60° F. and 86–88% R.H. In spite of a loss of fruit weight during storage all strains showed at the end of storage an increase in juice and citric acid percentage, although for Villafranca and Eureka the citric acid per ton was slightly lower than for Lisbon.

3045. Cohen, A.
The effect of different factors on the ascorbic acid content in citrus fruits. 1. The dependence of the ascorbic acid content of the fruit on light intensity and on the area of assimilation.
Bull. Res. Coun. Israel, 1953, **3**: 159-70, bibl. 31.

From a series of experiments on Shamouti and Valencia oranges and grapefruit it was concluded that the vitamin C content of the fruit is determined by the intensity of light received by the fruit and leaves. The light intensity received by the leaves controls the amount of assimilation products formed in the leaves which, after translocation to the fruit, provide raw material for the biosynthesis of ascorbic acid. The intensity of light falling directly on the fruit, apart from determining the restricted photosynthetic activity of the fruit, regulates the degree of conversion of the assimilation products to ascorbic acid.

3046. Siddappa, G. S., and Bhatia, B. S.
A comparative study of the composition and bitterness of loose jacket oranges grown in India.
J. sci. industr. Res., India, 1954, **13B**: 148-50, bibl. 2.

Loose-skinned [mandarin] oranges of average size and quality from the Coorg, Nagpur, Assam and Wynaad regions of India contained juices of very similar composition as regards total soluble solids, acidity, pH, sugars and ascorbic acid. The juice of Assam oranges was free from bitterness, whereas that of oranges grown in the other regions showed a marked tendency to develop bitterness on processing.

Citrus—spraying for cultural purposes.

3047. Wedding, R. T., Erickson, L. C., and Brannaman, B. L.
Effect of 2,4-dichlorophenoxyacetic acid on photosynthesis and respiration.
Plant Physiol., 1954, **29**: 64-9, bibl. 28.

In experiments on Washington Navel orange and the alga *Chlorella pyrenoidosa*, inhibition of photosynthesis was related to the concentration of undissociated 2,4-D acid molecules in the solution used for treatment. There were two phases of inhibition: one, in a low range of undissociated acid concentration, is proportional to the logarithm of this concentration; the other, covering a higher concentration range, is proportional to the concentration of undissociated 2,4-D, and may represent a direct or indirect destruction of chlorophyll by 2,4-D. The effect of the same concentrations of 2,4-D on respiration was slight. [From authors' summary.]

3048. Savvides, K.
Prevention of pre-harvest drop of oranges.
Countryman, Nicosia, 1954, **8** (3): 17.

In small-scale trials in Cyprus, orange trees were sprayed with 2,4-D at the rate of 5 c.c. "Fernimine" to 28 gal. water. The pre-harvest drop on sprayed trees was 4·7%, and on unsprayed 25·8%.

3049. Deszyck, E. J., Reitz, H. J., and Sites, J. W.
Basic copper arsenate—a new material for grapefruit maturity sprays.
Citrus Mag., 1954, **16** (7): 15-17, bibl. 2.

Copper arsenate proved a satisfactory substitute for lead arsenate as a maturity spray for grapefruit giving a reduced leaf residue and comparable fruit quality. The spray can also be effective in controlling melanose, when fortified with an additional standard copper fungicide.

Citrus—diseases and pests.

(*See also* 2397, 2654, 3016, 3021, 3100f, l, o.)

3050. Schneider, H.
Anatomy of bark of bud union, trunk, and roots of quick-decline-affected sweet orange trees on sour orange rootstock.
Conditions of phloem of sour orange tree trunk in winter.
Effect of trunk girdling on phloem of trunk of sweet orange trees on sour orange rootstock.
Hilgardia, 1954, **22**: 567-81, bibl. 21, illus., **22**: 583-91, bibl. 4, illus., and **22**: 593-601, bibl. 8, illus.

The primary anatomical change occurring in sweet orange trees on sour orange rootstocks after infection by quick decline is necrosis of sieve tubes below the bud union. It is followed by degeneration of the older sieve tubes above the union, accelerated cambial activity and other reactions of a secondary nature.

Healthy sour orange trees (rootstock and seedling) maintained throughout the winter a band of functioning phloem 500 microns wide. A ring of degenerating phloem external to this was either absent or up to 100 microns wide. Occasionally there were abnormally wide bands of degenerating phloem or bands of necrotic sieve tubes within the functioning phloem.

Sieve-tube degeneration above artificial girdling seemed to be identical with that induced by girdling brought about by necrosis of sieve tubes below the union of a quick-decline tree.

3051. Schneider, H., and Wallace, J. M.
Tests on orange trees top-worked to lemons.
Calif. Citrogr., 1954, **39**: 224, 248-52, bibl. 9.

In California pathological studies were made on trees of Eureka lemon top-worked onto sweet orange trees on sour orange rootstocks, before and after infection with quick-decline virus. Trees top-worked after infection went through cycles of decline and recovery, and bud-unions of recently top-worked, declining trees showed typical necrosis of newly-formed sieve tubes in the sour orange stocks. Trees top-worked before infection did not decline except from causes other than quick-decline virus.

3052. Olson, E. O., and Sleeth, B.
Tristeza virus carried by some Meyer lemon trees in South Texas.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 84-8, bibl. 12, illus.

In graft-transmission experiments with a weak chlorotic type of Meyer lemon, which grows poorly on sour orange but well on its own roots, the test plant, Mexican lime, exhibited the leaf symptoms of tristeza. This is the first report of the disease in Texas and present indications are that the strain is relatively mild.

3053. Calavan, E. C., and Weathers, L. G.
Relationship of fungi to shell bark of lemon trees.
Citrus Leaves, 1954, **34** (4): 6-7, 16, illus.
Relationship of fungi to shell bark of lemons.
Calif. Citrogr., 1954, **39**: 154-8, illus.

Experiments on lemon trees in California have shown that shell bark lesions are probably the result of a poor wound-healing capacity of the tree; fungi appear later as secondary infection. Control can be obtained by planting shell bark-resistant varieties. The varieties Monroe and Prior Lisbon and, to a lesser extent, nucellar Eureka strains, are relatively resistant. [See also *H.A.*, 24: 789.]

3054. Gutter, Y., and Littauer, F.
Antagonistic action of *Bacillus subtilis* against citrus fruit pathogens.
Bull. Res. Coun. Israel, 1953, **3**: 192-6, bibl. 12, illus.

In culture experiments *Bacillus subtilis* inhibited the growth of *Diplodia natalensis* and *Sclerotium bataticola*, except when injection into the fungus cultures was delayed. Against 13 different pathogens of citrus fruit, *Bacillus subtilis* was more or less strongly inhibitive, especially to *Penicillium digitatum*. In most cases its action was fungistatic but with *P. digitatum* it was fungicidal.

3055. Bazzi, B., and Scrivani, P.
Un metodo diagnostico per il riconoscimento del decorso del "mal secco" degli agrumi. **(A method of determining the progress of mal secco in citrus trees.)**
Phytopath. Z., 1954, **21**: 333-4, bibl. 1.

The mycelium of *Deuterophoma tracheiphila*, the causative agent of mal secco, advances down an infected branch from the tip. Healthy and diseased wood can generally be differentiated at a glance by the presence of reddish-orange streaks in the latter, but the characteristic coloration is not always present, especially on newly infected wood. The application of ammonia to the surface of a branch from which the bark has been removed will bring the colour out in diseased wood.

3056. Oršanskaja, V. N.
Results of attempts to find and apply a method for the early diagnosis of mal secco disease of lemon trees to ensure the use of clean budwood. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1953, No. 6, pp. 90-7, bibl. 4.

Application of KOH or NaOH solutions enhanced the reddish discoloration shown on the cut surface of lemon wood infected by *Deuterophoma tracheiphila* before any external symptoms of the disease became visible. It was found that a 1% solution of either of these substances, which were safe to handle and harmless to plant tissue, was sufficient for the early diagnosis of the disease and could be used to detect infected budwood of lemon and probably other citrus. Commercial methods of application have yet to be worked out. [See also *H.A.*, 23: 4517.]

3057. Sleeth, B.
Winter Haven decline in citrus.
Plant Dis. Reptr, 1953, **37**: 425-6, bibl. 6.

A serious disease of citrus trees, 10 years old or older and on various rootstocks, at the Winter Haven Experiment Station and in surrounding districts of Texas, is described. Investigations failed to show that a virus or nematode was responsible but have consistently revealed the presence of *Pythium ultimum* in root and soil samples taken from diseased trees. It is thought, however, that adverse soil conditions as well as *Pythium* contribute to the disease.

3058. Olson, E. O.
A crown rot of citrus rootstock seedlings caused by *Sclerotium rolfsii.*
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 29-31, bibl. 6.

Nursery seedlings of sour orange occasionally show symptoms (including softening of the bark of the crown roots and persistence of dried leaves on the dead plant) similar to those of cotton root rot (*Phymatotrichum omnivorum*) but caused by *Sclerotium rolfsii.*

3059. Chowdhury, S.
Control of citrus trunk borer.
Sci. and Cult., 1954, **19**: 457-9, bibl. 1, illus.

Monohammus versteegi is the most serious pest of Khasi orange (*Citrus reticulata*) in Assam and it also attacks *C. jambhiri.* The grub bores into the pith, generally at the base of the trunk, and kills the tree in 3–6 years. The rate of attack can be halved by monthly or bi-monthly washes with BHC or DDT up to 2½ ft. from the ground. Grubs can be destroyed by inserting materials such as carbon bisulphide, formaldehyde and PDB in the tunnels and plugging the entrance holes.

3060. Jeppson, L. R.
Treatments for the control of mites attacking citrus.
Calif. Citrogr., 1953, **38**: 384.

Recommendations are tabulated for the use of various acaricides, and their time of application, dosage and method of application for the control of each of the following mites: citrus red mite (*Metatetranychus citri*), six spotted mite (*Tetranychus sexmaculatus*), Lewis mite (*T. lewisi*), Yuma mite (*T. yumensis*), citrus bud mite (*Aceria sheldoni*), citrus rust mite (*Phyllocoptruta oleivora*) and citrus flat mite (*Brevipalpus lewisi*). [See also *H.A.*, 23: 1164.]

3061. Knorr, L. C., and Thompson, W. L.
Control of leprosis with miticidal sprays.
Citrus Ind., 1954, **35** (5): 9, 12-13, bibl. 7, illus.

Leprosis, also known as Florida scaly bark and nailhead rust, is caused by *Brevipalpus* mites feeding on citrus. Effective control was achieved by one pre-blossom application of wettable sulphur.

3062. Spencer, H., and Norman, P. A.
Control of heavy infestations of purple scales on grapefruit trees.
Citrus Ind., 1954, **35** (3): 7-8, bibl. 3.

Experiments in Florida were made over three years with Ruby grapefruit, using parathion sprays to control purple scale (*Lepidosaphes beckii*). It was shown that on trees sprayed with copper and nutrients, 2 lb. of 15% wettable parathion should be added to the post-bloom combination spray and 1 lb. to each of the summer and autumn wettable sulphur sprays. After the first year 1 lb. added to each spray should keep the infestations under control.

3063. Spencer, H., and Norman, P. A.
Control of purple scale.
Citrus Ind., 1954, **35** (5): 8, 14, bibl. 2.

In Florida, experiments were made over 2 years on the control of purple scale (*Lepidosaphes beckii*) on tangerine trees. Satisfactory control was obtained by using 15% wettable parathion powder, applied twice a year, in June and August.

3064. Cressman, A. W., and Broadbent, B. M.
Susceptibility of resistant and non-resistant strains of the California red scale to oil and to parathion.
J. econ. Ent., 1953, **46**: 907, bibl. 5.

California red scales, *Aonidiella aurantii*, that had become most resistant to HCN were not resistant to parathion and were also slightly easier to kill with oil than were strains less resistant to fumigation.

3065. Dean, H. A.
Desert damp-wood termites as a threat to young citrus planted on recently-cleared brushland.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 79-81, bibl. 1.

Kalotermes (*Paraneotermes*) *simplicicornis* can cause serious losses locally. In control tests chlordane at 1 lb. or more per 50 trees in 60 gal. water per tree applied within a 6-foot ring gave complete control. Recently cleared brushland should be worked to row crops for several years before citrus is planted.

3066. DeWolfe, T. A., and others.
Citrus nematode activity reduced by fungus plants.
Citrus Leaves, 1954, **34** (2): 11, illus.

Examination of a shavings mulch in an irrigated citrus grove has shown that species of the fungus *Arthrobotrys* are parasitic on the citrus nematode *Tylenchulus semipenetrans.*

3067. Sleeth, B.
Methyl bromide injury to citrus seedlings.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 82-3, bibl. 2.

Tests showed that soil fumigation with methyl bromide had a pronounced depressing effect on height growth and girth expansion in nursery seedlings of Cleopatra mandarin, Mexican lime, and sweet and sour orange.

3068. Bingham, F. T., and others.
Fluoride injury to citrus.
Calif. Agric., 1954, **8** (5): 12, 15.

Leaf analyses were made in citrus groves in industrial and non-industrial areas of California. In non-industrial areas the average content of fluoride present in the leaves was less than 1 p.p.m. In industrial areas there was great variation in the F content, the highest average content being in Fontana, where it was 95 p.p.m.; in Los Angeles County the averages ranged from 12 to 37 p.p.m. So far no injury to citrus in the field, which can be attributed to F, has been noted.

Citrus—packing, storage and products.

(*See also* 2316, 2319, 3100r.)

3069. Anon.
Factors influencing the storage life of citrus fruit.
Citrus Gr, 1954, No. 241, pp. 6-7, bibl. 5.

Orchard factors affecting storage life are outlined. The use of fungicides in treating tanks is advocated to prevent attack by blue and green moulds. Soda ash solutions in concentrations of 1¾–3% are used for lemons and grapefruit; borax (6–8%) or borax-boric acid solution (4%–2%) for oranges. Temperatures of 115°–120° F. are necessary for controlling brown rot; higher temperatures may cause rind injury. 2,4-D or 2,4,5-T, at 500 p.p.m. or 200 p.p.m. respectively, may be used in the rinsing water to control black button and alternaria decay. Lemons stored before shipping should be kept at 58° F., grapefruit at 60° F. with a humidity of 82–87%. Navel and Valencia oranges, if not ethylened, should be held in a precooler at 36–38° F. and 90–95% humidity for a period not exceeding 3 weeks. Good ventilation is required in all cases. J.S.

3070. Metlickiĭ, L. V.
Some basic problems of the biology of fruit storage. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1954, No. 1, pp. 83-94, bibl. 6.

Fruit storage is discussed with particular reference to citrus. While low storage temperatures are shown to reduce the organic acid content and cause physiological breakdown, high temperatures encourage the development of micro-organisms and increase respiration in citrus fruits. For lemons a general storage temperature of 7° C. is recommended, for oranges 5° C., mandarins 3° C., pears and grapes 0° C. and apples −1° C. For prolonged storage only fruit of optimum physiological maturity is suitable, and success is affected by external conditions of growth, i.e. place of origin. The percentage spoilage in mandarins grown at Ahalseni, Adzar S.S.S.R. after 4 months storage was 3 times higher than in those grown at Suhumi, Abhaz S.S.S.R. Against storage diseases in commercial production, systematic disease control during growth, scrupulous hygiene and disinfection of harvesting equipment and stores are considered adequate.

3071. Mahmoud, S. E. M.
Prestorage treatment of grapefruit with 2,4-D and its effect on metabolism in storage.
Diss. Abstr., 1954, **14**: 8, being *Publ.* 6775 of 80 pp.

The effect of 2,4-D on the respiratory processes of grapefruit stored in rooms and on the trees was studied with individual juice sacs, and the results correlated with changes of total acids and total soluble solids in the juice. Untreated fruits had a relatively low O_2 uptake and CO_2 production, but 2,4-D treatment, poor quality fruit, room storage or storage on the tree reduced this gas exchange. A climacteric rise occurred only in untreated and treated fruit of good keeping qualities. O_2 uptake was reduced to a greater extent than CO_2 production by 2,4-D, which apparently influences some enzyme system involved in the aerobic respiration cycle. Much anaerobic respiration occurred in tree-stored fruits, which respired organic acids in preference to sugars. Tree-stored fruits, especially those treated with 15 p.p.m. 2,4-D, were less metabolically active and showed a lower climacteric than room-stored fruits. Soluble constituents decreased and the soluble solids/acid ratio increased in both room and tree storage, although changes occurred faster in the latter. Granulation of fruit sacs, a result of prolonged tree storage, was found to be due to the deposition of cell wall material. *In vitro* studies with juice sacs showed that 100 to 1,000 p.p.m. 2,4-D greatly inhibited O_2 uptake. It was also shown that the sacs contain a respiratory system similar to that of cytochrome oxidase. Fruit abscission is prevented either by reduction of respiration by 2,4-D, thus preventing the oxidation of the natural auxin, or by 2,4-D acting as an auxin itself and so preventing abscission.

3072. Fletcher, W. A.
Use of diphenyl wraps against decay in N.Z. lemons.
N.Z. J. Agric., 1954, **88**: 115-20, illus.

Lemons stored in diphenyl wrappers showed less mould and stem-end rot than unwrapped fruit; after 124 days storage 93·5% of wrapped lemons were marketable compared with 61·7% of unwrapped lemons.

3073. Moreau, C.
Le problème de la protection des agrumes dans les transports et en entrepôts. **(The problem of protecting citrus in transit and in storage.)**
Fruits d'Outre Mer, 1954, **9**: 51-9, bibl. 4, illus.

Brief descriptions are given of the rots caused by the *Penicilliums*, *Phomopsis citri*, *Phytophthora parasitica*, *Alternaria citri*, *Oospora citri-aurantii*, and *Diplodia natalensis*, and the conditions that favour their development. Physical control measures include improved cultural and harvesting practices, the minimum of handling during transport, suitable packs, good ventilation, shorter periods of transport, correct storage conditions (8° C. optimum, high R.H. but not saturation, good ventilation), and paper wrapping. Subjects discussed in connexion with chemical control are the attributes of a fungicide, periodical disinfection of stores, testing the efficacy of fungicides, and experiments in stores. After 2 months' storage at 7°–8° C. and 3 months at 3°–4° C. the percentage of rot was much lower in oranges wrapped in paper treated with 2% quaternary ammonium than in unwrapped fruit and fruit wrapped in untreated paper.

3074. Hill, E. C.
Microbiological examination of Jaffa oranges with stylar end spot.
Citrus Mag., 1954, **16** (6): 7, 28-9, 32, bibl. 4, illus.

Jaffa oranges infected with black rot (*Alternaria citri*) give frozen concentrate an off-flavour and a high microbiological count. Complete separation of infected fruit from good fruit by visual inspection is not possible even though black rot is often accompanied by a brown stylar-end spot. An investigation was undertaken to find out whether other micro-organisms are responsible for stylar-end rot, which often occurs in the absence of black rot, and whether any correlation exists between the occurrence of stylar-end spot and internal deterioration in Jaffa oranges. The incidence of internal deterioration was found to be very great early in the season but to decrease as the season advanced. Means of eliminating infected fruit would be to remove prematurely coloured fruit very early in the season, since infected fruit often colours prematurely, and to pick late after most of the infected fruit has dropped. *Alternaria* was the chief organism isolated from Jaffa oranges infected with stylar-end spot. No correlation was found between the occurrence of stylar-end spot and visible internal deterioration.

3075. Chandler, B. V., and Kefford, J. F.
The chemistry of bitterness in orange juice. 4. Limonexic acid.
Aust. J. Sci., 1953, **16**: 28-9, bibl. 5.

Limonexic acid is a newly-named compound found in orange seeds and in the peel of immature Washington Navel oranges.

3076. McCready, R. M., and Owens, H. S.
Pectin—a product of citrus waste.
Econ. Bot., 1954, **8**: 29-47, bibl. 102, illus.

The history of citrus culture, the occurrence of pectin and its chemical and physical properties, pectic enzymes and the nomenclature of pectic substances and pectic enzymes are discussed.

Olives.

(*See also* 3100c, d.)

3077. Louvrier, —.
La Station de Recherches pour l'Oléiculture et l'Arboriculture. Son origine—son programme. **(The Olive and Fruit Tree Research Station [at Sfax]. Its origin and programme.)**
Tunis. agric., 1954, **55**: 13-23.

There are 5 olive-growing zones in Tunisia (the north, the north-central, the south-central, the Sahel de Sousse, and the south and far south) with average annual rainfalls ranging from 1,500 mm. in parts of the north to under 200 in the south. At Sfax the average annual rainfall and mean annual temperature are 200 mm. and 19° C. The total number of productive trees in Tunisia is estimated at nearly 20 million and the oil yield in 1951 was 45,000 tons. The Station at Sfax was founded in 1953 and its programme consists of plantation studies (regeneration by planting and cutting back, manuring, and pruning), studies on the biology, genetics and cytology of the olive, and on soil, entomology, pathology and climate. Regeneration studies in progress are (1) interplanting one-year-old rooted cuttings in a 50-year-old plantation; (2) planting rooted cuttings on the site of a newly-cleared 70-year-old plantation; (3) the performance of 70-year-old trees under sub-soiling, manuring and cutting back; and (4) a fertilizer trial in a mature plantation.

3078. Hartmann, H. T.
Leafy Sevillano olive cuttings.
Calif. Agric., 1954, **8** (5): 6, 16, illus.

Leafy cuttings of Sevillano olive were propagated in mist humidification, under greenhouse and lath-house conditions, in California. Air conditioning spray nozzles, delivering about 1½ gallons of water per hour, were used and bottom heat of 70° F. was maintained, the rooting medium being coarse vermiculite. In the greenhouse the highest strike, 73%, was of cuttings from the water-sprout growth of a mature tree which had been treated with indolebutyric acid at 4,000 p.p.m., and a fungicide, 50% 2,3-dichloro-1,2-naphthoquinone. In the lath-house, cuttings from mature trees treated with both hormone and fungicide showed 55% rooting, and from young trees 58%; when no fungicide was used the figures were 43% and 45% respectively.

3079. Blommaert, K. L. J.
The rooting of olive cuttings.
Fmg S. Afr., 1954, **29**: 156, bibl. 1, illus.

Experiments to show the effect of the rooting medium on olive cuttings were made at Stellenbosch. The best results were obtained with sifted sand alone or 2 parts of sand to 1 part of vermiculite; these gave 70% rooting. Vermiculite alone also gave good results. Treatment with an indole-3-butyric acid plus α-naphthaleneacetic acid mixture almost doubled the rooting percentage and the number of roots formed per cutting.

3080. Hartmann, H. T.
Effect of winter chilling on fruitfulness and vegetative growth in the olive.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 184-90, bibl. 14.

Winter chilling is conducive to fruitfulness in the olive, but is not necessary for vegetative growth. In general, with the varieties grown in California a mean January temperature below 50° F. is necessary for satisfactory production. In combined greenhouse and outdoor trials with the Mission and Barouni varieties the degree of flower production and consequent fruiting was proportional to the amount of winter chilling received. The effect of chilling is to stimulate flower initiation rather than to break the dormancy of flower buds already present, as is the case with deciduous fruits. The greatest amount of vegetative growth was produced by plants kept indoors throughout the winter, but even under continuous favourable greenhouse temperatures a period of reduced growth was noted during January, indicating the presence of a slight rest period of the buds.

3081. Morettini, A., and Pulselli, A.
La fecondazione dell'olivo. **(Olive fertilization.)**
Ital. agric., 1954, **91**: 163-72, bibl. 2, illus.

In continuation of their studies on olive pollination [see *H.A.*, 24: 818] the authors made further investigations in part of the province of Viterbo where the plantations consist almost entirely of the self-sterile Caninese variety. Field experiments showed that (1) the Caninese trees, which give normal yields under normal circumstances, are pollinated by trees of compatible varieties growing a considerable distance away in neighbouring districts; and (2) rain during anthesis hinders the transport of pollen by wind and may result in much reduced yields.

3082. Brichet, J.
Le millerandage des olives ou la "schinocarpie" de l'olivier. **(Millerandage of olives or schinocarpy in the olive tree.)**
Fruits et Prim., 1953, **23**: 446-9, bibl. 8, illus.

In millerandage or schinocarpy unfertilized ovaries remain attached to the shoots and grow to the size of a lentil. The condition occurs in all countries bordering the Mediterranean, is generally believed to be due to cold damp weather during flowering which interferes with fertilization, and can perhaps be regarded as rudimentary parthenocarpy. Its occurrence may be linked with self-sterility and genetic characters. Observations made during a tour of the Mediterranean basin in 1953 led the author to the conclusions that schinocarpy is not confined to damp cold places and that, once inadequate fertilization has occurred, the cessation of growth of the ovary and its persistence in rudimentary form are due to a combination of bad ecological and bad cultural conditions. He recommends a fundamental revision of the principles of olive growing.

3083. Sarasola, A. A., and Abiusso, N.
Acción toxica de filtrados de cultivos de "*Alternaria tenuis*" sobre olivo y tomate. **(Toxic effect of culture filtrates of *Alternaria tenuis* on olive and tomato.)** [English summary 9 lines.]
Rev. Fac. Agron. Eva Perón, 1953, **29** (1): 67-71, bibl. 12, illus.

Injection of culture filtrates of *Alternaria tenuis* isolated from olive induced wilt in tomato and symptoms of alternariosis in olive. This result confirms Sarasola's hypothesis that the new disease of olives reported by him in 1949 is caused by toxins produced by this fungus. [See *H.A.*, 22: 2370.]

3084. Papo, S., and Peleg, J.
Trials in control of the olive leaf spot, caused by the fungus *Cycloconium oleaginum*. [Hebrew, with English summary ½ p.]
Bull. Minist. Agric. Israel **34**, 1952, pp. 8, bibl. 2, illus.

Olive leaf spot (*Cycloconium oleaginum*) occurs all over Israel, causes reduced yields and is favoured by a damp climate. Local varieties are more susceptible than European ones. In control trials spraying was more effective than dusting, and a copper fungicide (perenox) than an organic (dithane). One spray should be given in the second half of October and should be followed, in years of high rainfall, by another in January.

3085. Pupillo, M.
L'"occhio di pavone", o "vaiolo", dell'olivo. **(Olive leaf spot.)**
Inf. fitopat., 1952, **2**: 95-6, illus.

Olive leaf spot disease (*Cycloconium oleaginum*) causes premature leaf fall and sometimes complete defoliation, a reduction in the quality and yield of fruit, and a general weakening of the tree. Control is by applying a fungicide, such as bordeaux mixture, Caffaro powder in water, cuprous oxide or, if also treating scale, calcium polysulphide, by severe pruning to let in light and air, by destroying diseased fallen leaves, and by balanced fertilizing avoiding excessive nitrogen.

3086. Rui, D., and Bonfante, S.
Parassiti minori dell'olivo nel Veneto: cilindrosporiosi (lebbra) e occhio di pavone. **(Minor diseases of the olive in Venetia: cylindrosporiosis and leaf spot.)**
Agric. Venezie, 1954, **8**: 265-71, bibl. 2.

Notes are given on cylindrosporiosis (*Cylindrosporium olivae*) of which the symptom is depressed spots on the fruit, violet at first and later yellowish with a dark edge; and on leaf spot (*Cycloconium oleaginum*). Recommendations concerning cylindrosporiosis are to pick early or when the first signs of attack are seen, to keep healthy and diseased fruit separate and process the latter immediately, and to spray with fungicide.

3087. Logothetis, C.
Progress in the control of olive fly.
FAO Plant Prot. Bull., 1954, **2**: 89-92, bibl. 1, illus.
La lutte contre la mouche de l'olive en Italie et en Grèce en 1953. Résultats des recherches et conclusions. **(Olive fly control in Italy and Greece in 1953. Results of research and conclusions.)**
Oléagineux, 1954, **9**: 315-21, illus.
Investigations on the control of the olive fly in Italy and Greece.
World Crops, 1954, **6**: 227-31, illus.

As a result of the FAO conference on *Dacus oleae* at Florence in 1953 [*H.A.*, 23: 4553] co-ordinated experiments were made in Greece and Italy in 1953 to investigate the Berlese method systematically and to test some organic insecticides as cover sprays. The Berlese method was again found not to give satisfactory results under all conditions. It may be suitable where the fruit ripens early or is for oil, but it is not satisfactory for dessert olives or in warmer areas where the insect has more than 6 generations a year. Of the synthetics used only parathion gave consistently good results (99% clean fruit); one application of 0·06% emulsion gave the best results. Further experiments with parathion are necessary, especially as regards toxicity to man.

The second paper is a French account of the same work, and the third covers the same ground.

3088. Sacantanis, K. B.
Études biologiques et lutte expérimentale contre *Dacus oleae* Gmel. (la mouche de l'olive) dans la région de Marrakech. **(Biological studies and control experiments on the olive fly, *Dacus oleae*, in the Marrakesh district.)**
Fruits et Prim., 1954, **24**: 9-13.

Experiments in 1953 on the control of *Dacus oleae* on Picholine Marocaine (Zeitoun) olives with phosphoric esters led to the conclusion that the best results can be obtained during the "white phase" (periode blanche) between the first spring growth and fruit set, when the olive fly exists only in the adult stage and is consequently vulnerable to attack. Early treatment shortly before flowering destroyed overwintering adults, treatment shortly before flowering destroyed spring-hatched adults, and treatment at the beginning of fruit set destroyed late-hatched and immigrant adults. White phase treatment was also highly efficacious against other olive pests, namely a psyllid [unnamed] and the moth *Prays oleellus*.

3089. Zakarija, A.
Maslinova lisna šiškarica. **(A cecidomyid pest of olives in Istria.)** [French summary 7 lines.]
Zasht. Bilja, 1953, No. 20, pp. 79-81, bibl. 4.

The occurrence in Istria of *Perrisia oleae* is recorded for the first time. The pest was found to be widespread on the whole Adriatic coast of the province and also on the islands of Cres and Hvar. For control, applications of DDT, BHC or parathion are suggested.

3090. Fiori, G.
Il fleotribo dell'olivo (*Phloeotribus scarabeoides* Bern.). **(The olive borer *Phloeotribus scarabeoides*.)**
Inf. fitopat., 1952, *Suppl.* to No. 5, pp. 2-3, illus.

Notes are given on this olive boring beetle, which weakens branches by excavating chambers at their base and thus exerts an injurious influence on shoots, flowers and fruit. The chief means of control is baiting with cut branches placed in a shady situation for about a month in spring. Among other salutary measures is the removal of infested branches used as support posts.

Passion fruit.

(*See also* 3100m.)

3091. Williams, C. G.
Preparing passion fruit for the fresh fruit market.
Qd agric. J., 1954, **78**: 81-8, illus.

The subject is dealt with under the following headings: harvesting, grading, packing containers and methods.

Persimmons.

(*See also* 3100n.)

3092. du Preez, D., and Boyes, W. W.
The persimmon (*Diospyros kaki* L.F.).
Fmg S. Afr., 1954, **29**: 139-40, 145, bibl. 1, illus.

Propagation is by cleft grafting on 2-year-old stocks of *Diospyros lotus* or *D. virginiana*. Varieties grown at Bien Donne were Osmond, Kingcot, Tipo-Tipo, Hyakume, Mazeli, Triumph, Kulco-Kuma, Nitaru, Tanenachi, and Tsuma Margari, all of which are seedless. Storage tests showed that 31° F. was the most suitable temperature for the fruits.

3093. Čitašvili, S. Š.
Observations on natural reproduction of the Caucasian persimmon. [Russian.]
Agrobiologija, 1953, No. 2, pp. 119-22, illus.

In western and eastern Georgia the Caucasian persimmon (*Diospyros lotus*) is found growing freely in groups. Under controlled conditions but on similar soils, stratified seed sown in groups produced healthy plants, 37–46% of which survived the winter (minimum temperature −18° C.), while sowing in rows resulted in weaker plants none of which overwintered.

Tung.

(*See also* 3299, 3310.)

3094. Nyasaland.
Tung.
Rep. Nyasaland Dep. Agric., Part II, 1952 and 1953, 1954, pp. 20-4.

Budding v. *seedlings.* Results confirmed those of 1951. [See *H.A.*, 23: 3504.] *Clone trials.* Biennial bearing becomes more pronounced as the trees approach maturity. The 4 best of the original clones are the A-type M13 and M8 (vigorous, large, erect trees coming slowly into heavy bearing) and the B-type 14 and 10 (precocious, smaller, umbrella-shaped trees, coming into heavy bearing early). Promising younger clones are listed; all show biennial bearing. *Intercropping and cover crops.* In a long-term experiment a maize/legume cover is giving the best tung yields followed by soya, grass-and-weeds, and *Glycine javanica*. *Fertilizer trials.* Interim results are given.

3095. Shear, C. B., Crane, H. L., and Myers, A. T.
Nutrient element balance: Response of tung trees grown in sand culture to potassium, magnesium, calcium and their interactions.
Tech. Bull. U.S. Dep. Agric. **1085**, 1953, pp. 52, bibl. 34, illus.

The effects of varying levels and ratios of calcium, magnesium, and potassium on the growth and mineral composition of the leaves of seedling tung trees grown in sand culture were studied in an experiment having a complete block design of four replications and involving a 3 by 3 by 3 factorial arrangement of the above-named cations. The results show that each of these 3 elements has a highly significant primary effect as well as interactions on all criteria of tree growth and on the accumulation of the 12 elements studied. The bearing of the results of this experiment on the interpretation of leaf analyses is discussed. It is emphasized that the primary effects and complex interactions between the level of supply of the various elements and their effects on leaf composition and growth do not invalidate the use of leaf analyses as a means of determining nutritional status of plants, but rather demonstrate the importance of a more complete understanding of these phenomena in order to increase the value of foliar analysis. [Authors' summary.]

3096. Neff, M. S., and others.
Effects of nitrogen, phosphorus, potassium, calcium and magnesium on bearing tung trees on Red Bay soil.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 79-93, bibl. 11.

Seedling tung trees in a factorially designed experiment on Red Bay soil near Monticello, Florida, were supplied with 2 levels each of N, P, K, Ca and Mg over 7 years. N and K were found to be the most important of the elements provided. K deficiency symptoms were decreased by K applications. Yields were increased only by N and K and the interaction between the two was such that the combination of high N with high K gave highest production. At the beginning of the experiment the level of N had the major and K the minor effect on production, but after 4 years K had become the dominant factor affecting yields. K hastened and N delayed fruit maturity. The oil content of the fruit was increased consistently by high K treatments [see also *H.A.*, 24: 830].

3097. Merrill, S., Jr., and others.
Responses of tung trees on Lakeland fine sand to less common elements.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 94-102, bibl. 10.

In addition to basic N, P, K treatments yearly applications of factorial combinations at 2 levels each of Ca, Cu, Mg, Mn and Zn were made over a period of 10 years to budded tung trees growing in Lakeland fine sand near Fairhope, Alabama. The effects of differential treatment on nutrient accumulation in leaves, incidence of leaf disorders, soil pH and tree size and yield are summarized. The most striking finding was the constant interaction between Mg and Zn, which was highly significant for accumulation of K and Mg in the leaves, for incidence of scorch and defoliation, and similar in trend, though less pronounced, for tree size and fruit yield. [See also *H.A.*, 23: 1218.]

3098. McKinney, R. S., and others.
Loss of oil in hulling tung fruit in the field and at the mill.
J. Amer. Oil Chem. Soc., 1953, **30** (2): 83-5, from abstr. in [*Publ.*] *U.S. Dep. Agric., Bur. agric. industr. Chem. south. Reg., List Publs* **AIC-319 Suppl. 4,** 1953, p. 8.

Methods for analysing commercial tung hulls for oil have been developed. Samples of hulls from mill and field operations were collected and analysed. Loss of oil when the fruit was hulled varied from 0·6% to 7·3%, with an average loss of 2·7% based on the total amount of oil in the fruit. Differences in loss between grove and mill hulling were not significant. With a loss of 2·7% of the oil in hulling, a recovery of 87·9% oil on the hulled nuts would be equivalent to a recovery of 85·5% oil on the whole fruit.

3099. Holmes, R. L., and McKinney, R. S.
Tung hulls and press cake.
[*Publ.*] *U.S. Dep. Agric.* **AIC-357,** 1953, pp. 14, bibl. 17, illus.

Notes are given on the uses, actual or potential, of tung hulls as a fertilizer conditioner, a mulching material for ornamental shrubs, an organic manure, a fuel, a source of potash (the ash), compost, plastics, and chemicals; and of tung press cake as a fertilizer, stock feed, and plastics.

Noted.

3100.

a Aldrich, D. G., and Taylor, O. C.
Nitrogen fertilizer practices in California citrus orchards.
Citrus Leaves, 1954, **34** (3): 8-10, 29, bibl. 7, and *Calif. Citrogr.*, 1954, **39**: 144, 162-8, bibl. 7.

b Anon.
Avocado.
S. Indian Hort., 1954, **1**: 141, illus.
Notes on varieties and localities in South India.

c Anon.
L'amélioration de la production oléicole du Maroc. **(Improving olive yields in Morocco.)**
Terre maroc., 1954, **28**: 56-8.

d Arzee, T.
Morphology and ontogeny of foliar sclereids in *Olea europaea*. II. Ontogeny.
Amer. J. Bot., 1953, **40**: 745-52, bibl. 24, illus.
[For I see *H.A.*, 24: 1912b.]

e Bajwa, B. S., and Kaura, N. R.
Review of fruit industry in the Punjab—planting and economics of a 25-acre orchard.
Indian J. Hort., 1953, **10**: 67-73.
Containing various fruits.

f Bitters, W. P., Brusca, J. N., and Dukeshire, N. W.
Exocortis transmission tests.
Calif. Agric., 1954, **8** (4): 4-5, 12, illus.
For another account see *H.A.*, 24: 1855.

g Chapot, H.
Contribution à la systématique des agrumes en Afrique du Nord. **(Contribution to the systematics of citrus in North Africa.)**
[*Publ.*] *Inst. Fruits Agrumes colon.* [1953?], pp. 7.

h Chevalier, A.
Les peuplements de dattiers dans le Sahara. **(The natural stands of date palms in the Sahara.)**
Rev. int. Bot. appl., 1953, **33**: 600-1.
Notes on distribution and numbers from l'*Economie Pastorale Saharienne* with comments by M. Chevalier.

i Griffiths, F. P., Lime, B. J., and Stephens, T. S.
Notes on the processing characteristics of limes.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 110-13, bibl. 5.

j Hodgson, R. W.
Citriculture in Egypt.
Citrus Leaves, 1954, **34** (2): 6-8, 14, 31-3, bibl. 2, illus., and *Calif. Citrogr.*, 1954, **39**: 143, 159-62, 188, 198-201, bibl. 2, illus.

k Klimenko, V. N.
The formation of navel fruits in the orange.
[Russian.]
Agrobiologija, 1953, No. 1, pp. 103-6, bibl. 3, illus.

l Knorr, L. C.
Transmission trials with crinkle-scurf of citrus.
Plant Dis. Reptr, 1953, **37**: 503-7, bibl. 4.
For another account of this disease see *H.A.*, 24: 1854.

m Lordello, L. G. E.
Insetos que vivem sôbre o maracujazeiros. III.—Notas acêrca de *Dione juno* (Cramer) (Lep., *Nymphalidae*) e relação de alguns outros insetos habitualmente coligidos de *Passiflora* spp. **(Insects living on the passion fruit plant. III. Notes on *Dione juno* and some other insects associated with *Passiflora* spp.)** [English summary 1 p.]
Rev. Agric. Piracicaba, 1954, **29**: 23-9, bibl. 7, illus.
Notes on some pests of *Passiflora vernicosa* and other spp.

n MILJANOVSKIĬ, E. S.
Injury done by dragonflies to Caucasian persimmon. [Russian.]
Priroda, 1954, **43** (2): 118.

o RIEHL, L. A., GUNTHER, F. A., AND BEIER, R. L.
Application of precision photoelectric colorimeter to determination of oil deposit on laboratory-sprayed grapefruit.
J. econ. Ent., 1953, **46**: 743-50, bibl. 14.

p SINCLAIR, W. B., AND CRANDALL, P. R.
Polyuronide fraction and insoluble carbohydrates of orange peel.
Bot. Gaz., 1953, **115**: 162-73, bibl. 11.

q SLEETH, B., AND GAUSMAN, H.
Cleopatra mandarin seedling response to soil amendments.
Proc. 8th annu. Rio Grande Valley hort. Inst., 1954, pp. 95-6.
Manure and various chemical compounds.

r SMITH, R. J., AND TINLEY, J. M.
Lemons in cartons.
Calif. Citrogr., 1954, **39**: 223, 232.
Economics of cartons *versus* boxes.

s STEWART, I., AND LEONARD, C. D.
Correction of molybdenum deficiency in Florida citrus.
Proc. Amer. Soc. hort. Sci., 1953, **62**: 111-15, bibl. 12, illus.
For same information see *H.A.*, 24: 1840.

t VARADARAJAN, B. S., AND SUBRAMANIAN, C. K.
Mandarin oranges of Coorg.
Indian J. Hort., 1953, **10**: 90-7, bibl. 21.
Climatic and soil conditions and cultural practices.

u VITUŠKINA, I. V.
Pollination of lemon with lily pollen. [Russian.]
Agrobiologija, 1953, No. 1, p. 109.
A 7-year-old lemon tree grown indoors pollinated with lily pollen produced some ripe fruits.

v WINSLOW, M. M., AND ENDERUD, J.
The Emerald avocado.
Citrus Leaves, 1954, **34** (3): 22-3.
A frost-tolerant variety for inland valleys.

w WINSLOW, M. M., AND ENDERUD, J.
The Clifton avocado.
Citrus Leaves, 1954, **34** (4): 18.
An early green-skinned variety.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 3269y, 3278, 3293, 3299, 3300, 3303, 3307, 3311-3313.)

3101. OPSOMER, J. E.
The teaching of tropical agriculture in Europe. II: Belgium.
Trop. Agriculture Trin., 1954, **31**: 119-25.

The history, grades awarded, admission regulations and syllabuses of higher and intermediate tropical agricultural education in Belgium.

3102. INSTITUT DES FRUITS ET AGRUMES COLONIAUX.
Inventaire botanique des collections au 31 Décembre 1950. **(Catalogue of plant collections on 31 December, 1950.)**
[*Publ.*] *Inst. Fruits Agrumes colon.*, [undated, received 1954], pp. 18.

A list is given of the species and varieties of plants in the collections at the I.F.A.C. Central Station at Foulaya in French Guinea and at the Regional Stations at Nyombe in the Cameroons, Azaguie in the Ivory Coast and Neufchateau in Guadeloupe on 31 December, 1950. The plants number 843 and are listed alphabetically by families; botanical and varietal names are given. The scope of the collections is indicated by the following examples: mango—some 50 varieties, pineapple—100, and Valencia orange—40. A list is also given of some 600 cover crop, green manure and hedge plants.

3103. GOSSWEILER, J.
Nomes indígenas de plantas de Angola. **(Vernacular names of plants of Angola.)**
Agron. angol., 1953, No. 7, pp. 587.

The major part of this work consists of a description of the principal plants of Angola, of which both the scientific and vernacular names are given.

3104. HARDY, R.
L'activité de la Station de Kiyaka. **(The work of Kiyaka Station.)**
Bull. Inf. I.N.E.A.C., 1954, **3**: 1-36, illus.

The objects of the Kiyaka Experiment Station, opened in 1947, are to promote native agriculture in the Kwango district of the Belgian Congo. The commercial crops with which it deals include mulberry, tobacco, castor, sisal and *Abroma augusta*.

3105. VENKATARATNAM, L.
Horticultural wealth of Hyderabad.
Indian J. Hort., 1953, **10**: 149-53.

Notes are given on the culture of mangoes, vines, cherimoya, bananas, citrus, guavas, falsa (*Grewia* spp.), figs, and vegetables.

3106. BELTRÁN GALINDO, G.
Economía de producción agricola en Colombia. **(The economics of agricultural production in Colombia.)**
Rev. Fac. nac. Agron. Colombia, 1953, **13** (43): 1-204, bibl. 98.

Notes are given on the geographical and agricultural zones of Colombia and its crops, including coffee, bananas, sugar cane, plantains, beans, coconuts, cacao, tobacco, fruits, sisal, vegetables and rubber. The problems facing Colombian agriculture and agrarian policy, the expansion of agricultural production, and investigations that require to be undertaken on the economics of production are then discussed. Among these last are basic enquiries on economic geography, rural sociology, and agricultural statistics, and fact-finding studies on types of agriculture, farm organization, production costs, power, machinery, equipment, and land tenure.

3107. Terra, G. J. A.
The distribution of mixed gardening in Java. [Indonesian summary 1 p.]
Landbouw, 1953, **25**: 163-203, bibl. 33.

A survey is given of the distribution over Java of so-called wet and dry fields and mixed gardens. In comparing the advantages of the dry field and mixed garden systems, it is thought that the latter provides a better diet. Improvements in mixed gardening can be made by drainage, terracing and irrigation.

3108. Snethlage, P.
Enige beschouwingen betreffende transport met tractoren op bergcultuurondernemingen (1). (**Transport by tractors on highland estates.**) [English and Indonesian summaries ½ p. each.]
Bergcultures, 1954, **23**: 3-13, 31-7.

In Indonesia tractors are found better than lorries for transport of produce. Tractor capacity and performance are discussed. Lighter-wheeled tractors are recommended for transporting pest and disease control materials.

Bananas.

(*See also* 2124, 2316, 2397, 2641, 3269k, t, 3270m, n, 3299.)

3109. I.C.T.A.
Research Schemes. Bananas.
A.R. imp. Coll. trop. Agric., Trinidad, 1952-53, 1954, pp. 29-30.

The main activity has again been the breeding of new male parent material. Other work has been concerned with the chemistry of bract pigmentation, the effect of various hormones and antihormones on fruit development and seed fertility, and the taxonomy of the edible bananas.

3110. Simmonds, N. W.
Varietal identification in the Cavendish group of bananas.
J. hort. Sci., 1954, **29**: 81-8, bibl. 15.

The Cavendish group of bananas is a complex of edible triploid cultivars of *Musa acuminata*, of which four mutants are of economic importance—the Dwarf Cavendish, Giant Cavendish, Robusta and Lacatan. Characters of these and other mutants within the group are described.—Banana Res. Scheme, I.C.T.A., Trinidad.

3111. Simmonds, N. W.
Notes on banana varieties in Hawaii.
Pacific Sci., 1954, **8**: 226-9, bibl. 9.

Brief introductory remarks on the origin of the edible bananas are followed by notes on the 2 groups of varieties in Hawaii, namely, the "Hawaiian" varieties introduced, used and named by the Hawaiians, and the "alien" varieties introduced in recent times by Europeans.

3112. Guyot, H., and Fouqué, A.
"Le Poyo." Un bananier cultivé en Guadeloupe. Observations sur sa végétation. (**Notes on the growth of Poyo, a banana grown in Guadeloupe.**)
Fruits d'Outre Mer, 1954, **9**: 60-7, illus.

Poyo is the standard export banana of Guadeloupe and is a variety of *Musa sinensis*. Its fruit is equal in quality to that of the dwarf banana and travels well. The plant is susceptible to leaf spot.

3113. Muthuswamy, S., and Radhakrishna Rao, K.
An abnormal banana bunch.
S. Indian Hort., 1954, **2**: 23-4, bibl. 5, illus.

A Basrai plant in the Coimbatore Agricultural College orchard produced a late inflorescence, the bananas from which did not reflex but remained curved downwards or at right angles to the rachis and developed very slowly.

3114. Forti, G.
Variations du volume des espaces intercellulaires (porosité) au cours de la maturation de la banane. (**Changes in volume of intercellular spaces in the banana during ripening.**)
Fruits d'Outre Mer, 1954, **9**: 124-6, bibl. 3.

Volume of intercellular space varies widely during ripening, falling to a minimum and rising again before full maturity is reached. The curve resembles that of respiratory intensity but there is a slight time lag.—Staz. sper. Freddo, Milan.

3115. Institut des Fruits et Agrumes Coloniaux.
Étude de la maturation de la banane en vue de l'amélioration des conditions de transport. (**A study of the maturation of the banana with a view to improving transport conditions.**) [English summary ½ p.]
Rev. gén. Froid, 1952, No. 2, reprinted as *Bull. Inst. Fruits Agrumes colon.* **6**, 1952, pp. 16, bibl. 9, illus.

Banana physiology is outlined. Maturation after cutting consists of a pre-climacteric phase of low respiratory activity during which composition remains practically unchanged, followed by a climacteric phase of higher respiratory activity and relatively rapid physiological change which begins when the fruit is dark green and ends before it is completely yellow. Fruit should be cut at the highest weight permitting a pre-climacteric phase equal to the transport period. Stage of development can be gauged by means of a penetrometer. [See *H.A.*, 23: 2233.] The length of the pre-climacteric phase depends principally on the stage of maturation of the fruit when cut and on temperature; other factors are humidity and the concentration of oxygen, carbon dioxide and ethylene. The pre-climacteric period for *sinensis* bananas transported from French West Africa to Europe is 16–18 days unrefrigerated and 24–27 days refrigerated. Packaging is discussed.

3116. Shmueli, E.
Irrigation studies in the Jordan Valley. 1. Physiological activity of banana in relation to soil moisture.
Bull. Res. Coun. Israel, 1953, **3**: 228-47, bibl. 22.

Under the conditions of the Jordan Valley, the range between field capacity and two-thirds of total available water constitutes the optimum range of soil moisture for Cavendish bananas with regard to both physiological activity and yield. Only within this range is soil moisture in the root zone readily available and only within its limits can the plant fully exercise those physiological functions which depend on water supply. Between successive water applications, the moisture content of the root zone may drop below the optimum range; the longer the duration of sub-optimal conditions, the greater the loss in the accumulation of assimilation products. Due to the sensitive response of the stomata to variations in soil moisture, infiltration tests form a reliable indicator for fixing the correct irrigation intervals.

3117. HORD, H. H. V., AND FLIPPIN, R. S.
Head rot of banana rhizomes in Honduras.
Plant Dis. Reptr, 1953, **37**: 326-7.

This apparently new disease is characterized by the pseudostem falling as the result of a break in the rhizome at a point near the ground level. This is preceded by the development of decay in the rhizome but not necessarily by any pronounced symptoms on the leaves or fruit. The decay commonly passes from parent rhizomes to suckers. Tissues in the early stages of decay have always yielded bacteria but no fungal mycelium. Investigations into the cause and control of the disease are in progress.

Cacao.

(*See also* 3148, 3269g, o, 3270e, g, 3274, 3320.)

3118. I.C.T.A.
Research Schemes. Cacao.
A.R. imp. Coll. trop. Agric., Trinidad, 1952-53, 1954, pp. 30-1.

Plant breeding: I.C.S. clones, witches' broom resistance. *Plant physiology:* Shade and fertilizer experiments; hormone sprays, mineral nutrient injection, stock-scion trial, iron chlorosis (control with chelates). *Entomology:* epidemiology in relation to drought and excessive soil moisture.

3119. HOLLIDAY, P.
The cultivated cacao of Colombia.
J. agric. Soc. Trin. Tob., 1953, **53**: 397-406.

Colombia is not a large producer of cacao and imports half its requirements from Ecuador. The first introductions appear to have been all criollo in character and they were distributed mainly in the Cauca and Magdalena valleys. The 3 most important regions of production today are in the upper Magdalena valley, the lower Cauca valley (Antioquia department) and the upper Cauca valley (Valle and Cauca). Notes are given on cultivation in these and other areas and on disease distribution.

3120. GARCÍA B[ECERRA], C.
Breve análisis de la situación cacaotalera en Colombia. **(Brief analysis of the cacao-growing situation in Colombia.)**
Cacao en Colomb., 1952, **1**: 1-3.

In recent years cacao production in Colombia has not kept pace with the increase in consumption. The chief limiting factors are discussed. In Cauca and Valle de Cauca, which together produce 70% of the country's cacao, the plantations contain a high proportion of Criollo and few pay owing to low yields. The serious fall in Criollo yields, which were high up to 25–30 years ago, may be due to environmental changes resulting from extensive deforestation. Improved Forastero types may replace the Criollos.

3121. ANON.
Normas para el cultivo del cacao. **(Advisory notes on cacao growing.)**
Cacao en Colomb., 1952, **1**: 107-18, illus.

Recommendations are made on varieties (Angoleta and Cundeamor), nursery work, planting out, cultural practices, disease and pest control, harvesting and processing, and on vegetative propagation.

3122. ARCHIBALD, J. F.
Culture *in vitro* of cambial tissue of cacao.
Nature, 1954, **173**: 351-2, bibl. 3.

Bark isolates similar to bud "shields" of both healthy and swollen-shoot infected cacao were cultured successfully on a simple solid medium, and, without an external source of growth substance, produced sufficient cambial tissue for subcultures to be made. Subcultures made slow growth in White's standard medium, but the addition of coconut milk to the medium or the use of a medium of pure coconut milk produced spectacular increases. Morphological changes observed in successive subcultures are recorded.—W.A.C.R.I.

3123. BROWN, H. B.
Separation of pigment cells of cacao.
Nature, 1954, **173**: 492, bibl. 2.

A method is described for the separation of pigment cells from the cotyledons of several types of cacao. This separation of the polyphenolic and purin constituents from the other components of the bean provides a new approach to the study of these constituents, particularly the polyphenols.

3124. CERBULIS, J.
Sugars in Caracas cacao beans.
Arch. Biochem. Biophys., 1954, **49**: 442-50, bibl. 25.

The presence of raffinose, stachyose and their products of hydrolysis (melibiose and manninotriose) has been discovered in Caracas cacao beans. Three unidentified reducing sugars have also been found, of which two were ketose-containing sugars. [From author's summary.]

3125. MILLER M., R.
Contribución al estudio de la catalasa en el gineceó de la flor de cacao. **(Contribution to the study of catalase in the gynoecium of the cacao flower.)**
Cacao en Colomb., 1952, **1**: 89-99, bibl. 32.

Tests showed that cacao gynoecia contain abundant catalase. Gynoecia of self-sterile flowers showed greater catalase activity than those of self-fertile flowers. The gynoecia of self-fertile flowers showed much greater catalase activity when the tree was in flush than when it was dormant; they showed maximum activity immediately after pollination, but activity decreased greatly within a few days. It is concluded that catalase activity is necessary for the initiation of fertilization.

3126. Naundorf, G.
Contribución al estudio de la polinización, fecundación y fructificación en el cacao. **(Contribution to the study of pollination, fertilization and fruiting in cacao.)**
Cacao en Colomb., 1952, **1**: 55-70, bibl. 9, illus.

The chief factors causing low cacao yields in Colombia are the great number of self-sterile trees, the small number of beans per pod, the low rate of fruit set, partial loss of self-fertility, diseases and pests, and certain phenomena of degeneration such as the formation of parthenocarpic fruit without beans, and the non-opening of the staminodes which enclose the stigma during the period of greatest fertility. Recent research by the Campaña Nacional de Cacao is reviewed. [For accounts of this work see *H.A.*, 22: 1886, 23: 3527, 23: 3528, 24: 870, 3129, 3130.]

3127. Bridgland, L. A.
Study of the relationship between cacao yield and rainfall.
Papua N. Guinea agric. Gaz., 1953, **8** (2): 7-14.

The conclusions drawn from observations made on young cacao at the Lowlands Experimental Station, Keravat, in 1950/52 were that (1) there is no evidence that rainfall has a regular significant effect on pollination, (2) there is no evidence that pollination is an important factor limiting yield, (3) there is relatively little cherelle wilt for the first 3–4 weeks after pollination irrespective of rainfall, (4) for the period 4–12 weeks after pollination high rainfall results in excessive cherelle wilt and low rainfall in little cherelle wilt, and (5) for the period 12–16 weeks after pollination high rainfall increases yield through rapid growth of pods.

3128. Alvim, P. de T.
New propagators for rooting cacao cuttings.
Cacao, 1953, **2** (47/48): 1-2, illus.

Two new propagating frames for rooting cacao cuttings developed at Turrialba in 1951/52 differ only in size and constructional material. Their salient feature is the cotton cloth used in the covers which are maintained constantly wet by water descending by capillary action from a constant-level trough. With this system rises in temperature due to increases in light intensity are not followed by decreases in R.H. inside the propagator, as in glass-covered frames. Frequent watering is only necessary for the 3 or 5 initial days (3 times a day). From the fifth day onwards, watering can be reduced to once every 3 days, or to even longer intervals, according to environmental conditions. The rooting medium is sawdust. Notes are given on construction, degree of shade, and temperature.

3129. Naundorf, G.
Influencia de algunos fungicidas sobre fecundación y fructificación en el cacao. **(Effect of certain fungicides on fertilization and fruiting in cacao.)**
Cacao en Colomb., 1952, **1**: 71-82, bibl. 8.

Experiments at the Palmira Agricultural Experimental Station showed that the premature bud and flower drop and the reduction in the fertilization and fruiting rate caused by copper fungicides is due to their action in inhibiting pollen germination and pollen tube growth and in partly inactivating the growth substances necessary for the proper functioning of the abscission zone. Where the use of copper fungicides is unavoidable they can be mixed with plant growth and nutritive substances which mitigate their ill effects.

3130. Naundorf, G., and Miller M., R.
Influencia de algunos insecticidas sobre la fecundación de cacao. **(Effect of certain insecticides on the fertilization of cacao.)**
Cacao en Colomb., 1952, **1**: 87-8, bibl. 3.

Tests showed that DDT, chlordane and toxaphene and dieldrin have no such effect. The use of insecticides in cacao plantations in Colombia is not recommended but is permissible in the Huila district for the local control of the more serious pests.

3131. Orellana, R. G.
Cacao diseases in Venezuela, Colombia, Ecuador and Trinidad.
FAO Plant Prot. Bull., 1954, **2**: 49-52.

The combined output of these four countries totals about 8% of world cacao production. The diseases mentioned are caused by *Marasmius perniciosus*, *Monilia roreri*, *Phytophthora palmivora*, *Ceratostomella fimbriata*, *Colletotrichum* spp., and *Rosellinia* spp. *Erythrina poeppigiana*, the immortelle shade tree, is apt to be killed in Colombia by *Calostilbe striispora*. A virus disease differing from the swollen shoot virus and cherelle wilt is also mentioned. There is much variation in the seriousness of attack in the different countries.

3132. Hanna, A. D., and Nicol, J.
Application of a systemic insecticide by trunk implantation to control a mealybug vector of the cacao swollen shoot virus.
Nature, 1954, **173**: 730-1, bibl. 2.

The application of dimefox (bis-dimethylamino fluorophosphine oxide) through 3·5 in. deep holes drilled of ground level at an angle of 45° around the trunks at cacao trees controlled the virus vector, *Pseudococcus njalensis*, as effectively as soil applications of the insecticide [see *H.A.*, 22: 3045] and was much more economical. The results presented show that a dose equivalent to 250 or 160 p.p.m. of the estimated aerial weight of the tree will give practically complete control of mealy bugs for a period of 8 weeks. Further experiments are in progress to establish whether repeated treatments at intervals of 8 weeks harm the trees.—West African Cacao Res. Inst., Tafo.

3133. Jaramillo A., R.
La urea y el marchitamiento de frutos jovenes. Nota preliminar. **(Urea and cherelle wilt. Preliminary note.)**
Cacao en Colomb., 1952, **1**: 101-6, bibl. 33.

In a preliminary experiment near Palmira foliage spraying with 1·0% urea at the end of the growth flush reduced cherelle wilt to one-third (22% after 4 weeks as compared with 67% in the control). Urea is believed to stimulate the production of natural growth substances. Growth substance spraying reduced wilt to 24%.

3134. García B[ecerra], C., and Naundorf, G.
Un año de experimentos sobre control de la moniliasis en cacao. **(A year's experiments in the control of moniliasis in cacao.)**
Cacao en Colomb., 1952, **1**: 31-40, bibl. 7.

An organic zinc and some inorganic copper fungicides were used in experiments made in 1952 on the control of pod rot (*Monilia roreri*) in Calabacillo and Amelonado cacao. Results and conclusions were that (1) cleaning, pruning and the removal of diseased pods greatly reduced incidence, (2) fungicides were not efficacious, (3) used alone fungicides reduced fertilization and yield and increased cherelle wilt and drop, (4) to counteract these ill effects fungicides should be applied combined with nutritive substances such as urea, calcium glycerophosphate and para-chlorophenoxyacetic acid, (5) control should consist of cleaning, pruning, and the removal of diseased pods coupled with 2 applications, 3 weeks apart, of an organic fungicide combined with nutritive substances at the beginning of the season.

3135. García Becerra, C., and Naundorf, G.
Control del chancro en el tronco del arbol. **(Control of cacao stem canker.)**
Cacao en Colomb., 1952, **1**: 51-4, bibl. 4.

Experiments at Palmira on the control of stem canker or red rot (*Phytophthora faberi*) in Criollo cacao showed that the standard method of cleaning out wounds and treating them with a paste of bordeaux mixture is successful up to a point but that much better results (over 90% cure) can be obtained by the use of a lanoline paste containing 0·1% alpha-naphthaleneacetic acid and 0·2% cuprous oxide or zinc ethylene bisdithiocarbamate.

3136. Orellana, R. G.
Infection and tissue changes of *Theobroma cacao* L. by *Phytophthora palmivora* Butl.
Turrialba, 1953, **3**: 167-72, bibl. 5, illus.

The method of infection of the flowers, flowering cushions, pods, stems and leaves of cacao by *Phytophthora palmivora* was studied in histological sections. The fungus sporulates in the uppermost cavities of the mesocarp of living pods and could thus survive there by escaping contact fungicides. In the leaf, infection is by direct penetration of the epidermal cells (not through the stomata) and young leaves are therefore more susceptible than mature ones.

3137. MacLean, J. A. R.
Some chemical aspects of "black-pod" disease in West African Amelonado cacao.
Emp. J. exp. Agric., 1953, **21**: 340-9, bibl. 19.

A comparison was made of the quantitative changes in various constituents of healthy and "black-pod" beans, obtained from (*a*) random harvesting in the field, and (*b*) pods inoculated *in situ* with a spore suspension of *Phytophthora palmivora* Butl. Cacao fat was not affected in quantity but there was an appreciable rise in the free fatty acid content of fat from diseased beans. There was a significant fall in the percentage of theobromine in diseased beans from pods sampled at random in the field. The content, however, was still greater than 2% (based on fat-free, shell-free beans). Total and protein nitrogen in both healthy and "black-pod" beans remained remarkably constant. Sucrose was recorded as the main sugar in healthy beans; the content was significantly lowered in "black-pod" beans. The extent of the losses caused by "black-pod" and the possible utilization of diseased beans are briefly discussed. [Author's summary.]

3138. Garcia B[ecerra], C.
Plagas del arbol de cacao en el Huila. **(Pests of the cacao tree in Huila.)**
Cacao en Colomb., 1952, **1**: 41-9, illus.

This paper is a summary of a report by the entomologist, A. Figueroa [Potes] on the pests of cacao in Huila, which is the third most important cacao-producing district of Colombia and that in which insect attack is most severe. Notes are given on the control of 13 species, 5 of which are of major economic importance. These 5 species include 2 stem-boring caterpillars, a boring beetle, a mirid and an ant.

Cloves and other Eugenia spp.

3139. Nutman, F. J., and Roberts, F. M.
***Valsa eugeniae* in relation to the sudden-death disease of the clove tree (*Eugenia aromatica*).**
Ann. appl. Biol., 1954, **41**: 23-44, bibl. 9, illus.

The fungus *Valsa eugeniae*, invariably found associated with sudden-death disease of the clove tree, has been shown to be a primary parasite of the mature tree. Saplings are resistant to it and seedlings immune. Water-borne spores can invade the root system of the tree. The slow-decline disease of clove saplings, which occurs in areas replanted after the previous stand has been killed by sudden-death, is also associated with the fungus. It is suggested that the slow-decline is the symptom expression of *Valsa* attack on young trees when these still retain some measure of juvenile resistance to it. [From authors' summary.]

3140. Anantanarayanan, K. P., and Venugopal, S.
Pests of *Eugenia jambolana* in Coimbatore (South India).
S. Indian Hort., 1954, **1**: 137-40, bibl. 8, illus.

The chief pests of jambolan (*Eugenia jambolana*) in Coimbatore are the caterpillars of *Carea subtilis*, *Phlegetonia delatrix*, *Oenospila flavifusata*, *Metanastria hyrtaca*, and *Euproctis fraterna*. In tests these were controlled by DDT and BHC sprays and dusts.

Coconuts.

(*See also* 2124, 3269f, h, l, m, 3270q.)

3141. Sethi, W. R.
A practical guide to coco-nut planting.
E. Afr. agric. J., 1954, **19**: 140-2.

Short notes are given on the selection of land and its preparation for planting, seed selection and nurseries, planting, cultivation and the interplanting of catch crops, harvesting and the preparation of copra, manuring, and control of the two main pests, rhinoceros beetles and coreid bugs. It has recently been found that biological control of the latter is enhanced by the presence of cashew, mango and citrus trees among coconuts, since these trees encourage an increase in the population of an ant which attacks the bug.

3142. COCONUT RESEARCH INSTITUTE CEYLON.
Planting coconuts on old rubber lands.
Leafl. Coconut Res. Inst. Ceylon **21,** 1953, pp. 3.

Complete clearance of the rubber is better than underplanting. Notes are given on environmental and soil conditions, pests and methods of planting.

3143. AIYADURAI, S. G., AND MOHAMMAD IBRAHIM, P. A.
Some useful plants for coconut nurseries.
Bull. Indian centr. Coconut Cttee, 1954, **7**: 179-81.

Trials showed that *Sesbania speciosa* and *S. grandiflora* are good shade and boundary hedge plants respectively for coconut nurseries. Cultural notes and costs are given.

3144. SATYABALAN, K.
A note on the occurrence of "buttery" kernel in coconut.
Indian Coconut J., 1953, **6**: 152-4, bibl. 4, illus.

An account is given of the condition known as buttery nut observed in one of ten coconuts from a bunch of the Philippine Laguna variety examined at the Central Coconut Research Station, Kasaragod. Literature on the subject is cited.

3145. MESA BERNAL, D.
"Alunamiento del coco", "asoleadura" o "mancha de la nuez". Consideraciones sobre la enfermedad del cocotero comunmente conocida con estos nombres. (**Coconut nut stain or blotch; notes on the coconut disease commonly known by these names.)**
Agric. trop. Bogotá, 1954, **10** (3): 17-27, illus.

The most serious disorder of coconuts in the Bananera district of the Magdalena province of Colombia is of unknown origin. The symptoms are confined to the fruit. The main symptom is necrosis of the cortex, affecting an irregular patch (or sometimes the whole fruit) with longitudinal cracks. The flesh is not affected but gum sometimes forms below the cortex and exudes through the cracks in the lesion. In young nuts the disorder inhibits development and may induce drop. In mature nuts it has no effect on the quantity and quality of the copra. The views of various authorities on the cause are outlined. Causes suggested are soil constitution, excessive soil humidity, and a micro-organism.

3146. WAY, M. J.
Studies on *Theraptus* sp. (Coreidae); the cause of the gumming disease of coconuts in East Africa.
Bull. ent. Res., 1953, **44**: 657-67, bibl. 8, illus.

Theraptus sp. occurs widely over the coastal region of British East Africa; a single feeding puncture is sufficient to destroy the developing coconuts. A population density of less than 2 per palm is sufficient to cause severe damage. BHC gives effective control.

3147. WAY, M. J.
The relationship between certain ant species with particular reference to biological control of the coreid, *Theraptus* sp.
Bull. ent. Res., 1953, **44**: 669-91, bibl. 12, illus.

The ant *Oecophylla longinoda* is a valuable predator of the coconut pest *Theraptus* sp., but this ant is itself destroyed by three ant species, *Anoplolepis custodiens*, *A. longipes* and *Pheidole punctata.* In preliminary trials dieldrin showed promise for controlling *A. custodiens.*

3148. DADANT, R.
Contribution à l'étude des maladies du cocotier, du cacaoyer et du caféier aux Nouvelles-Hébrides. (**Contribution to the study of the diseases of the coconut palm and of cacao and coffee trees in the New Hebrides.)**
Agron. trop., 1954, **9**: 41-8, bibl. 4, illus.

The author, who paid visits to Espiritu Santo and neighbouring islands in 1951 and 1952, gives short notes on the fungal diseases occurring in coconut, cacao and coffee in the New Hebrides and their control. He states that there is no serious coconut disease in the islands and that black pod, practically the only serious cacao disease present, can be effectively brought under control by good cultural practices. Coffee is a minor crop compared with coconuts and cacao.—Inst. franç. Océanie.

3149. O'CONNOR, B. A.
The rhinoceros beetle (*Oryctes rhinoceros* L.) in Fiji.
Agric. J. Dep. Agric. Fiji, 1953, **24** (1/2): 35-46, bibl. 2, illus.

History in Fiji, progress of local control campaign, identification of the pest and the injury it causes, local research on control, life history and habits, distribution in Fiji, local and introduced predators, and flight-range.

3150. LORDELLO, L. G. E.
Sôbre os inimigos naturais da lagarta das Palmáceas. *Brassolis sophorae* (L.) (Lep., Brassolidae). (**On the natural enemies of the palm caterpillar, *Brassolis sophorae*.)** [English summary ½ p.]
An. Esc. sup. Agric. "Luiz de Queiroz" Piracicaba, 1952, **9**: 23-31, bibl. 23, illus.

Notes are given on some of the egg, larval and pupal parasites of *Brassolis sophorae*, with particular reference to *Spilochalcis morleyi.*

Coffee.

(*See also* 3148, 3269e, 3270h.)

3151. HORN, C. L.
World's need for more efficient coffee production.
Foreign Agric., 1954, **18**: 43-6.

World coffee production (5·1 thousand million lb. in 1953) is slightly less than it was 20 years ago (5·4) and slightly below current world consumption (5·3) which is rising. Productivity per man-hour and per acre have not increased over the years probably because the problem until about a decade ago was over- not under-production. Relatively little work has been done on breeding and genetics, cultural practices or the control of insect and fungal pests—which together reduce the Western Hemisphere crop by 10–15%—and even the botanical classification of the species has not yet been satisfactorily worked out. Current research in the Western Hemisphere is outlined. It holds out promise, but a concerted international effort is required to cope adequately with the problems facing the industry.

3152. Indian Coffee Board.
Fifth Annual Report of the Research Department of the Indian Coffee Board, 1951/52, 1953, pp. 80, R. 1, being *Bull. Res. Dep. Indian Coffee Bd* **5**.

An account is given of research at Balehonnur and Chethalli. *Botany.* Breeding, selection and vegetative propagation of arabica and robusta. *Chemistry.* Various NPK fertilizer experiments, bulky *v.* concentrated manurial experiment, catalysation of nutrients, *Erythrina lithosperma* pruning experiment (to test release of nitrogen from root nodules consequent on pruning), green manure analyses, abnormal leaf-fall. *Agronomy.* Influence of pruning on yields, robusta pruning and manuring, agronomic practices, effect of weedkiller on coffee, single *v.* multiple stem, seed germination, mulching, topping, vegetative propagation*. *Plant protection.* Time and strength of bordeaux spraying, relative merits of various copper fungicides with wetters and spreaders, bordeaux *v.* copper sandoz, pest control (*Xylotrechus quadripes*, *Lecanium viride* and *Pratylenchus pratensis*). *Robusta pulping experiments.*

3153. Alvim, P. de T., and Havis, J. R.
An improved infiltration series for studying stomatal opening as illustrated with coffee.
Plant Physiol., 1954, **29**: 97-8, bibl. 9.

Measurements of the degree of stomatal opening on coffee were made, using an infiltration series prepared with Nujol mineral oil, diluted with *n*-dodecane at 10 concentrations from 100%, 90%, etc., to 10% *n*-dodecane. The stomatal apertures of coffee leaves in direct sunlight decreased during periods of strong illumination at mid-day. Stomata of shaded leaves remained wide open throughout the day.

3154. Ferwerda, F. P.
A tentative breeding method for robusta and other allogamous coffee species.
Euphytica, 1954, **3**: 12-19, bibl. 7.

The author gives a brief account of the standard method of breeding robusta coffee in Indonesia, and suggests a simplification which would shorten the selection cycle from 25 to about 18 years.

3155. Satyanarayana, M. C.
Yield per acre of coffee in India.
Indian Coffee, 1954, **18**: 22-6.

Indian coffee acre yield statistics discussed include annual and six-yearly average annual yields, and yields according to tree age groups and sizes of estates for India as a whole and six-yearly average yields by States and Districts. For the last 2 six-year periods (1941/42–1946/47 to 1947/48–1952/53) robusta acre yields were 1·88–2·24 cwt. and arabica 1·55–1·73 [=210–251 and 174–194 lb.] and there were no definite trends upwards or downwards. Average yields of both species increased with size of holding from 5–10 up to 200 acres or more.

3156. Indian Coffee Board.
Conditions favouring vegetative propagation of coffee.
A.R. Indian Coffee Bd Res. Dep. 1951/52, 1953, pp. 49-56.

Single-noded leafy cuttings gathered from 4-noded arabica suckers were subjected to soaking for 12, 24 and 48 hours in (1) various growth-promoting substances and in (2) synthetic hormones; 48 hours caused high mortality. The substances used in the first experiment were dextrose, ammonium sulphate and indoleacetic acid separately and in various combinations, cow urine extract, ammonium phosphate, sucrose and potassium permanganate. Twelve hours' treatment with the substances was efficacious in the case 24 hours' treatment gave more success especially with the 4th internode. A combination of dextrose, ammonium sulphate and indoleacetic acid gave the best results. The hormones used in the second experiment were naphthaleneacetic acid, indoleacetic acid, indolebutyric acid, and 2,4-D. 12-hour treatment was superior to 24-hour. Concentrations of 100 p.p.m. were superior to 5 and 25 except in the case of 2,4-D, where 5 p.p.m. was best. In both experiments the 1st and 2nd internodes started rooting earlier, viz. within a month of planting, than the 3rd and 4th.

3157. Jones, P. A.
Transplanting and establishment of coffee.
Mon. Bull. Coffee Bd Kenya, 1954, **19**: 30-2, bibl. 6.

Notes are given on preparation of the land—bush clearance, weed control, soil conservation, spacing, size of planting hole, manuring—, preparation of plants—capping followed by transfer to pots for a few weeks before planting out—, transplanting, followed immediately by shading and mulching, establishment, which sometimes necessitates watering in first dry season, care after planting by the control of pests commonly causing serious damage to seedlings, namely green scale, star scale, mealybug, cutworm, dusty brown beetle, leaf-eating weevil and tip stem borer, and others, early pruning and cropping which includes the practices to be adopted for multiple- and single-stem training, and the removal of crop at the earliest stage after fruit set for the first 3 seasons to ensure that all starch manufactured is available for stem and root growth.

3158. Suárez de Castro, F.
Perdidas de suelo y agua en un cafetal y en un potrero. **(Soil and water losses in a coffee plantation and a pasture.)**
Bol. téc. Fed. nac. Cafet. Colombia, 1953, **1** (11): 1-20, bibl. 4, illus.

An account is given of field-scale experiments made in 1951 and 1952 in which soil and water losses through erosion and run-off were measured in a shaded coffee plantation (slope 10–20% at the top and 45–60% at the base, and in a pasture (*Axonopus micay*). Figures differed greatly between the 2 years but in both cases soil losses were very much greater from the coffee plantation (32 and 7 times) and water losses much less (half and three-quarters). It is concluded that soil conservation in coffee plantations should be based on cover cropping and the replacement of the hoe by the machete. [See also *H.A.*, 23: 1275 and 2259.]

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* See separate abstract.

3159. MARTINS, J. E. D.
Arborização dos cafezais. (**Shading coffee plantations.**)
Bol. Super. Serv. Cafe, S. Paulo, 1953, **28** (320): 8-16.

After a discussion of the ecological and manurial requirements of coffee the author reviews conditions in the State of São Paulo with special reference to shading. The climate is not greatly different from that of other coffee-growing areas (such as the north-eastern States of Brazil) where shade is used, but the south-west winds and the frosts are unfavourable factors, and the longer dry season results in lower yields due to inadequate rainfall and increased temperatures and solar intensity. Soil exhaustion and erosion are serious due principally to lack of shade.

3160. VAN PREHN, E., AND GUDE, C. J.
Enkele gegevens betreffende een practijk-plantdichtheidsproef met robustazaailingen. (**A spacing experiment with robusta seedlings.**) [English and Indonesian summaries 13 and 14 lines respectively.]
Bergcultures, 1954, **23**: 131-3.

Experiments were laid down in 1948 with robusta coffee, using close spacing followed by systematic thinning out after the first crops had been harvested. The provisional results, after 3 crops, show that the high cost of planting and maintenance is more than compensated for by higher early yields. [From authors' summary.]

3161. PARRA H, J.
Controles biológicos en suelos da la serie 60. (**Biological control in soils of series 60.**)
Controles biológicos en suelos de la serie 120. (**Biological control in soils of series 120.**)
Bol. inf. Colombia, 1953, **4** (47): 24-8, bibl. 1, illus., and 1954, **5** (49): 20-4, bibl. 2, illus.

The effects of N, P, K, Ca and Mg on 2 soil types of the Caldas coffee-growing region were determined in pot fertilizer experiments with arabica coffee, in which the elements were applied singly and in combination at different levels in 13 different treatments.

3162. GUTIÉRREZ Z., G.
El uso del agobio en la poda de formación del cafeto. (**The use of leader pegging in the training of coffee.**)
Suelo Tico, 1952, **6**: 204-8, illus.

Topping and pegging down the leader are compared as methods of multiple-stem training the vigorous Bourbon variety; pegging is recommended. Typica can also profitably be trained by this system.

3163. MELVILLE, A. R.
The new coffee factory on the coffee demonstration farm, Rukera Estate, Ruiru.
Mon. Bull. Coffee Bd Kenya, 1954, **19**: 33-9, illus.

A description is given of the new processing factory on the Kenya Coffee Board's Rukera estate, where coffee is depulped, fermented (three tank per pick system) and dried. Separation into grades occurs at all stages and individual grades are treated separately so that the highest quality is attained with each. The factory, which is designed to handle the crop from 80 acres, cost £2,500 including building and other materials, coffee and electrical machinery, and labour, but not water development charges. Labour requirements are a headman-mechanic and 10 labourers in the morning on washing and grading and 2 in the afternoon pulping.

3164. DAVIES, E. DE L., AND JONES, M. A.
Cafepro: máquina para remover químicamente el mucílago del café recién despulpado. (**Cafepro: a machine for removing the mucilage chemically from recently depulped coffee.**)
Turrialba, 1953, **3**: 151-5, bibl. 10, illus.

In a chemical process successfully tested in Guatemala for the removal of the mucilage from newly depulped coffee, 1 lb. wood ash in 2 gal. water is added to 100 lb. depulped beans and the mixture is stirred for 2 minutes. Half a pound of slaked lime in 2 gal. water is then added and stirring continues until the beans are clean. The process is completed in about 10 minutes and can be carried out in a Cafepro machine. This consists essentially of a rounded metal trough which contains the chemicals and in which a perforated metal cylinder containing the beans rotates. Paddles on the central shaft of the cylinder agitate the mixture. A scale diagram of the machine is shown.

3165. DADANT, R.
Le caféier en Nouvelle-Calédonie. Ses maladies. (**The coffee tree in New Caledonia. Its diseases.**)
Agron. trop., 1954, **9**: 49-58, bibl. 3, illus.

Coffee is the chief export crop. Arabica and robusta are grown, both under shade, on the plains and in the hills (up to 300 m.) at 2·0×2·5 m. and 3·0×3·5 m. respectively. The sole cultural practices are desuckering, weeding and topping. Yields average 230 kg. of depulped beans per ha. but well-kept arabica plantations give 250 and well-kept robusta 500 to 750 kg. Short notes are given on fungal and physiological diseases and their control. *Hemileia* is present but is not serious; *Poria* and *Rosellinia* are absent. Notes are also given on the diseases of the 4 chief shade trees.

3166. COEN, E.
Ciclos climáticos en 80 años de observaciones de las lluvias en San José y sus relaciones con el ojo de gallo (*Omphalia flavida*). (**Climatic cycles during 80 years of rainfall recording and their relationship to [coffee] leaf spot (*Omphalia flavida*).**)
Suelo Tico, 1952, **6**: 248-56, bibl. 10.

Meteorological records at San José indicate that the Costa Rican central tableland is passing through a climatic phase which is favourable to the development of *Omphalia flavida* and which may end in 1954. A plea is made for a detailed study of relationships between climatic conditions and diseases and for the control of the diseases by planning plantations according to the regional climate and by regulating the microclimate.

3167. Plá, J. L.
Informe sobre deshoja parcial del café. **(Report on partial defoliation of coffee.)**
Suelo Tico, 1952, **6**: 209-13.

Partial defoliation was tested as a means of controlling leaf spot (*Omphalia flavida*) in Tico hybrid coffee in which losses had previously been about 10% of the yield. One to three defoliations of different intensity took place in June/September. Complete defoliation caused dieback of the most tender shoots and prevented fruit maturation. Bushes in which the 4 terminal leaves were left on the shoots were, on the other hand, in good condition and free or nearly free from infection, and their fruit matured normally.

3168. Castaño A., J. J.
La llaga macana o cáncer del tronco y de los tallos del cafeto. **(Coffee stem and branch canker.)**
Bol. téc. Fed. nac. Cafet. Colombia, 1953, **1** (10): 1-25, bibl. 17, illus.

The arabica varieties typica, bourbon and maragogipe are susceptible to coffee stem and branch canker, caused by the wound parasite *Ceratostomella* sp., but *Coffea liberica* and robusta appear to be highly resistant. [This is the longest of 3 similar papers on the subject by the same author. See *H.A.*, 23: 4611 and 24: 911.]

3169. Foucart, G.
Un nouvel ennemi du caféier d'Arabie au Kivu: *Habrochila placida*. (Note préliminaire). **(A new pest of arabica coffee in Kivu: *Habrochila placida*. (Preliminary note.))**
Bull. Inf. I.N.E.A.C., 1954, **3**: 51-62, illus.

Habrochila placida has begun to cause some damage in arabica plantations in Kivu in recent years, probably as a result of the use of DDT and BHC. The larvae and adults attack the leaves, causing almost complete defoliation in severe attacks, the young fruits and the buds. Varietal resistance studies have been made. In control experiments phosphoric esters have caused 100% mortality in 3–6 hours. A single spray should be given in August/September just before the rains, followed, if necessary, by another 3 weeks later.

Guavas.

3170. Dutta, S.
Some guavas of Assam.
Indian J. Hort., 1953, **10**: 137-9, bibl. 8.

A botanical description (with key based on the fruits) is given of 7 varieties of guava, with short economic notes.

3171. Ramasomayazulu, M. V.
A promising guava (Lucknow No. 49) for the Agency tracts of the Andhra State.
Indian J. Hort., 1953, **10**: 154-6.

The Lucknow No. 49 guava grows well and gives high yields of good quality fruit in the Araku valley in Visakhapatnam Agency at elevations over 3,000 ft. and with maximum and minimum temperatures of 80–90° F. and 36–40° F. Notes are given on cropping and on propagation studies.

Mangoes.

(*See also* 2124.)

3172. Roy, R. S.
Studies of irregular bearing of mango (*Mangifera indica*).
Indian J. Hort., 1953, **10**: 157-60.

The biology of growth and reproduction in the mango is discussed. Irregular bearing may be overcome if half of the mature buds of the off-year can be forced to produce reproductive shoots in January/February and if vegetative growth can be forced in June/July in an on-year. Trials at Sabour show that N is the controlling factor in growth and production and gives best results when combined with P and K, while P and K singly have little effect. Ammonium sulphate should be applied in June immediately after harvesting, the dose being doubled in on-years, phosphate, namely bone meal or superphosphate, plus farmyard manure in October, and potash (wood ash or potassium sulphate) with every manuring. Notes are given on rates and methods of application, cultivation, pruning, ringing framework branches and breeding at Sabour.

3173. Singh, R. N.
Sex ratio and fruit setting in mango (*Mangifera indica* L.).
Science, 1954, **119**: 389-90.

The following mango varieties of differing cropping capacity were studied: Romani, Dashehari and Langra. The low fruit set in Romani is due to the large proportion of staminate to hermaphrodite flowers and the low percentage of hermaphrodite flowers in a panicle.

Oil palms.

(*See also* 3269n.)

3174. West African Institute for Oil Palm Research.
First Annual Report of the West African Institute for Oil Palm Research, 1952/53
pp. 135, 2s. 6d.

The Institute, which developed out of the former Oil Palm Research Station, began its independent existence on 1 April, 1952. It is organized in 6 divisions: agronomy, chemistry, engineering, plant breeding, plant pathology and statistics. Its research aims are fundamental study of the oil palm as a plant, improved culture from the point of view of the peasant farmer and the estate owner, the selection, breeding and multiplication of improved material, and better processing. The report gives a detailed account of research, an outline of which follows. *Agronomy:* establishment, field experiments [see next abstract]. *Chemistry:* soil, oil. *Engineering:* no research as yet. *Plant Breeding:* breeding, selection, progeny trials, segregation studies, seeds (production and distribution), pollination and pollen viability, botanical studies. *Plant Pathology:* diseases of seedling and mature palms (deficiency, fungal, and of unknown origin), pests, coconut palm diseases. [See also *H.A.*, 24: 926.]

3175. West African Institute for Oil Palm Research.
Agronomy Division. Field experiments.
A.R. W. Afr. Inst. Oil Palm Res. 1952/53, [1953], pp. 58-92.

This first "WAIFOR" annual report gives a detailed account of the agronomic field experiments in progress. An outline of the results of some of these follows. *Treatment of the felled bush.* Burning and non-burning (experiment begun in 1940): total yields almost identical. *Selection of planting material.* Seedling selection (1951): no significant difference in leaf production between 5 vigour classes. *Establishment methods and management of young plantations.* Establishment (1940, 1943): intercropping gave markedly higher yields in the early years than weed cover or leguminous cover. Deep planting *v.* mulching (1939, 1939, 1941): deep planting yields have been lower than mulching but appear to be catching up. *Spacing.* Spacing-grazing-intercropping (1945): annual and total yields much lower with elephant grass than natural cover and *Pueraria*. *Manuring.* Fertilizer (1948): N, P, K and Ca were applied at 3 levels in 1948; the most striking result has been a significant yield increase every year from K. Very heavy organic dressings in 1941 and 1942 continue to have a marked effect on yield; the average annual yield in the period 1942–51 was 132 lb. fruit bunches per palm compared with 57 lb., an increase of over 130%. *Replanting.* Normal replanting gave much higher yield per acre than, and substantially the same yield per palm as, Malayan "live-felling". *Maintenance of soil fertility.* Soil covers (1943): 8 covers including exotic cover crops, elephant grass, natural regrowth and *Acioa barteri* produced no significant differences in soil fertility.

3176. Institut de Recherches pour les Huiles et Oléagineux.
Les pépinières de palmiers à huile. Principes et méthodes. **(Oil palm nurseries. Principles and methods.)**
La transplantation des jeunes palmiers. **(Transplanting young palms.)**
Oléagineux, 1954, **9**: 251-8, illus., 323-8, illus.

These are two of a series of papers to be published on oil palm cultural practices used or developed by I.R.H.O. The first deals in some detail with germination in beds of sand, in boxes embedded in fermentation beds, and in heated greenhouses, and with pre-nurseries, and nurseries, soil preparation, spacing, shading, transferring from the pre-nursery, and length of use of nursery sites. The second covers date of planting which should be as soon as the main rains have begun, hole-digging and manuring, selection of plants at 12–18 months old, at least 8 cm. in diameter at the collar and 1·0–1·3 m. high, trimming by removal of dead and of spreading green leaves, and of half the length of erect leaves, only leaving the 2–3 inmost leaves intact, removal from nursery with a ball of earth, transport, planting with collar at soil level and soil well firmed and mulched, shading, which is not essential, tending and gapping up.

3177. Prevot, P., and Ollagnier, M.
Peanut and oil palm foliar diagnosis interrelations of N, P, K, Ca, Mg.
Plant Physiol., 1954, **29**: 26-34, bibl. 20.

Detailed results of a typical peanut experiment are reported to show the method used in foliar diagnosis. General results are given for the peanut and oil palm, and from these results critical levels of N, P, and K are approximated for both plants. Interrelations of elements are discussed from the standpoints of the ratios and correlations between N, P, K, Ca, and Mg. Correlations between N and P are generally positive; correlations between K and Ca or K and Mg are negative, while correlations between Ca and Mg are positive. In the oil palm such correlations may disappear when the sum K+Ca+Mg is lower than 2·0. The elements thus far analyzed have been subdivided into two large classes: the "protoplasmic class" for N and P, and the "basic elements class" for K, Ca, and Mg. [Authors' summary.]

3178. Luc, M.
Sur un cas de "leaf bend" du palmier à huile en Côte d'Ivoire. **(On a case of leaf bend in oil palms on the Ivory Coast.)**
Oléagineux, 1954, **9**: 161-3, bibl. 6, illus.

The chief symptom was the collapse of green leaves at the site of a transverse furrow on the petiole 30–50 cm. from its base. The disorder appeared early in 1952 and disappeared before the end of the year. It generally attacked only a few leaves of the highest-yielding, best-looking palms, did not reduce yield or cause death, and was commonest on plots receiving potassium.

3179. Cuvier, P.
Le carotène de l'huile de palme: généralités sur les carotènes. **(Palm oil carotene: general remarks on the carotenes.)**
Oléagineux, 1954, **9**: 262-7, bibl. 35.

A series of papers is to be published on the different methods of extracting carotene and the results of research by the Institut de Recherches pour les Huiles et Oléagineux. This first general paper is concerned with the constitution, properties, chromatography and determination of carotene.

Papaws.

(*See also* 3269u.)

3180. Merle, P.
Note sur la "viviparité chez le papayer" (*Carica papaya* L.). **(Note on vivipary in the papaw.)**
Fruits d'Outre Mer, 1954, **9**: 68-9, illus.

Of 1,800 fruits of 30 varieties examined in a year, 58 contained one or more (maximum 150) germinated seedlings at all stages from first appearance of the radicle to seedlings 5 cm. tall. Data on vivipary in a number of varieties are tabulated.—I.F.A.C. reg. Stat., Nyombé.

3181. Anon.
Hill papaya. *Carica candamarcensis* Hook.
S. Indian Hort., 1954, **2**: 17, illus.

The frost-hardy hill papaya grows at 5,000–7,000 feet, reaches 6–8 feet in height and produces yellow, sub-acid fruits 3–4 in. long. In experiments at the Hill Fruit Stations in the Nilgiris it was not a successful rootstock for the cultivated papaw, the fruits produced, though large, being of poor eating quality.

Pineapples.

(*See also* 2124, 2211.)

3182. Py, C., and Silvy, A.
Traitements hormones sur ananas. Méthodes pratiques pour diriger la production. **(Hormone treatment of pineapples. Practical methods of controlling production.)**
Fruits d'Outre Mer, 1954, **9**: 101-23, bibl. 4, illus.
Institut des Fruits et Agrumes Coloniaux.
Nouvelles données sur les traitements hormones. **(New information on hormone treatment.)**
Bull. Inst. Fruits Agrumes colon. **5**, 1952, pp. 6.

By hormone treatment pineapples can be induced to flower throughout the year and the harvest can thus be spread advantageously from the point of view of marketing and labour supply. Production costs are lower, maintenance is easier and the harvest period in a given area is shorter thanks to the treated plants all being at the same stage. Best results are given by acetylene (carbide powder or acetylene solution) which is effective at any season, and by alpha-naphthaleneacetic acid (NAA) which acts only up to 2½ months before the natural differentiation of the inflorescence, i.e. it advances flowering by up to 2½ months and in French Guinea can only be used between 1 September and mid-November. Acetylene gives an average flowering of 95% in the dry season; NAA gives comparable results. With Baroness Rothschild the interval between treatment and the appearance of the inflorescence is 6½ weeks with acetylene and 7½ with NAA, and that between treatment and harvesting (at export stage of maturity) in irrigated plantations in the dry season is 180 days with acetylene and a week more with NAA. Practical instructions for Guinea growers are given in some detail.

The second paper gives a short account of the experiments at an earlier stage.

3183. Missingham, L. J.
Soil conservation in pineapples.
Qd agric. J., 1953, **77**: 323-33, illus.

Soil erosion is a major problem in the pineapple-growing areas of south-eastern Queensland. Notes are given on the maintenance of soil structure, the conservation of organic matter by cover cropping and mulching, and on contour planting (including layout of water system and cultural problems).

3184. Williams, C. G.
Harvesting, handling and packing pineapples.
Qd agric. J., 1954, **78**: 17-32, illus.

This article deals first with fresh fruits, their selection, handling during harvesting, packing materials and methods, and the regulations for home and export markets, and secondly with the harvesting, grading and packing of factory fruit.

3185. Alvarez-García, L. A., and López-Matos, L.
Influence of root-knot nematodes on the decline in vigour of the Red Spanish variety of pineapple in Puerto Rico.
J. Agric. Univ. Puerto Rico, 1954, **38**: 61-72, bibl. 8.

Experiments during 1951-53 showed that soil fumigation with Dowfume W-85 was most effective in controlling root-knot nematodes in Red Spanish pineapples. The number of suckers and slips produced by soil-treated plants was 2 to 4 times higher than those produced by untreated plants. Fruit yield in treated plots was from 10·8 to 15·9 tons per acre, and in untreated plots 6·2 tons per acre.

Rubber trees.

(*See also* 2902, 3142, 3270r, s, 3318.)

3186. Muzik, T. J.
Development of fruit, seed, embryo, and seedling of *Hevea brasiliensis*.
Amer. J. Bot., 1954, **41**: 39-43, bibl. 14, illus.

Growth was measured of the fruit, seed, embryo and seedling of the Para rubber tree, *Hevea brasiliensis*. In general, the rate of development of the seed was most rapid after the fruit had reached maximum size, and that of the embryo after the seed had reached maximum size. The growth habit of the seed is rhythmical, periods of rapid elongation alternating with periods of absolute standstill. Growth takes place mostly at night. [From author's summary.]

3187. Rubber Research Institute of Malaya.
Mycorrhiza in *Hevea*.
Plant. Bull. R.R.I.M., 1954, No. 12, pp. 57-8, illus.

Endotrophic mycorrhiza occurs in rubber in the small surface lateral roots. Rubber grows well on sterile sand if supplied with the necessary nutrients, but on certain soils the ability to form mycorrhiza may be an important factor in the wellbeing of plantations.

3188. Westenberg, M. G.
Plantdichtheden voor monoclonale oculatietuinen. **(Plant spacing for monoclonal budded plantations.)** [English and Indonesian summaries 16 and 13 lines respectively.]
Bergcultures, 1954, **23**: 191-9.

On the basis of planting distance experiments with rubber over several years, the writer recommends that new plantings should be of monoclonal buddings. Thinning costs can be reduced by planting a permanent stand of 278 trees per hectare or by planting at 400 trees per hectare with one thinning at 3 years based on girth measurement.

3189. Rubber Research Institute of Malaya.
Tapping systems.
Plant. Bull. R.R.I.M., 1954, No. 11, pp. 32-7.

Brief descriptions are given of the main tapping systems now or recently in use in Malaya. These are half circumference alternate daily, full spiral fourth daily, double cut fourth daily, half circumference third daily, third spiral alternate daily, and periodic systems. The effects on some clones are mentioned.

3190. Wiersum, L. K.
Stimulering van de latexproductie door zelf te bereiden groeistof-pasta's. **(The stimulation of latex production by home-made hormone pastes.)** [English and Indonesian summaries 24 lines and 30 lines respectively.]
Bergcultures, 1954, **23**: 111-22, bibl. 12, illus.

The composition and preparation of a number of hormone pastes for stimulating latex production are given, 2,4-D being the hormone chiefly used. The paste is applied below the tapping cut to the bark, after the outer bark layers have been stripped off. Yield increases are very variable: in 6 months with one treatment 50 kg. more than normal was yielded and yield more than compensated for expense. Retardation of growth has not been observed. Treatment is not recommended in the dry season.

3191. Heinisch, K. F.
Influence of infra-red radiation on crude hevea rubber. [Indonesian and Dutch summaries ⅔ p. each.]
Arch. Rubb. Cult., 1954, **31**: 25-46, bibl. 22, illus.

A method for determining the ageing characteristics of crude rubber by means of infra-red radiation is described. The effects of copper and manganese and of sulphuric acid as a coagulant on the ageing of crude rubber have been investigated.

3192. Bolle-Jones, E. W.
Effect of mineral status on the concentration of rubber in *Hevea brasiliensis*.
Nature, 1954, **173**: 690, bibl. 4.

In sand culture experiments with clonal hevea seedlings it was found that nutrient deficiencies cause a reduction in the concentration of rubber in bulked stems and petioles during the early stages of growth only. The total rubber content of the plant was, however, governed by dry weight, which in turn depended on mineral status. Accordingly, it must be assumed that under field conditions nutrient deficiencies cause an appreciable decrease in rubber yield.—Rubber Res. Inst. Malaya.

3193. Vink, A. P. A.
Bodemtypen en bodemonderhoud in de rubbercultuur op West-Java en Zuid-Sumatra. **(Soil types and soil maintenance in hevea culture in West Java and South Sumatra.)** [English summary 5 pp.]
Arch. Rubbercult., 1953, **30**: 97-160, bibl. 52.

This detailed review covers soil types and their characteristics, soil erosion control, the results of manurial trials and the need for further research into the ecology of rubber.

3194. Rubber Research Institute of Malaya.
Rubber root diseases on other plants.
Plant. Bull. R.R.I.M., 1954, No. 12, pp. 60-2.

Observations on the root disease situation and on the extent and persistence of the root systems in a gutta percha (*Palaquium gutta*) plantation to be replanted with rubber showed that root disease should not become a major problem in the rubber.

3195. Gorenz, A. M.
Diplodia infection of hevea buddings and its prevention by the use of a protective fungicide.
Circ. U.S. Dep. Agric. **913**, 1953, pp. 22, bibl. 13, illus.

Infection of the bud patch of hevea buddings by *Diplodia theobromae* was found to be a major cause of budding failure. When the budding was done during periods unfavourable to the growth of the rubber tree, the infection at times also killed the cambium beneath the bud patch and even spread into the surrounding bark. An effective and practical treatment was developed, using a protective fungicide that was toxic to *Diplodia* and non-toxic to the cambium of hevea. The fungicide, as a water suspension, is applied with a cloth to the budwood and around the budding panel of the stock plant before budding. A screening test was developed to determine the suitability of various fungicides for possible use as budding protectants. Of the fungicides tested Fermate proved the most satisfactory. The lowest concentration of Fermate that gave consistently good results was a concentration of 200 g. of Fermate per litre of water. [From author's summary.] The investigations were a co-operative project mainly conducted at the Campo Experimental de Hule, El Palmar, Veracruz, Mexico.

Sugar cane.

(*See also* 3269a, c, d, s, v, w, 3270a, b, f, i, k, l, t, 3285, 3291.)

3196. International Society of Sugar Cane Technologists.
Proceedings of the I.S.S.C.T. 8th Congress, April and May 1953, Executive Cttee, I.S.S.C.T., Kingston, Jamaica, B.W.I., 1954, 10×6½ in., pp. 996, bibls., illus., U.S. $15.00.

This volume contains more than 120 papers by experts from various parts of the world on sugar cane culture (47), breeding (21), entomology (13), processing (26) and pathology (16). Many of these are the subjects of separate abstracts in this and the next issue of *Horticultural Abstracts*. Topics dealt with in the cultural papers include cultural practices, physiology, nutrition, manuring, soils, irrigation, rotations, weed control, crop logging, and yield and maturity testing.

3197. Asociación de Técnicos Azucareros de Cuba.
Memoria de la XXVI Conferencia Anual, Asociacion de Tecnicos Azucareros de Cuba, 1952. **(Report of the XXVIth Annual Conference of the Sugar Technologists of Cuba, 1952)**, Havana, 1952, pp. 294, illus.

The agricultural section of this report consists of 13 articles. The subjects include chemical fertilization, irrigation, borer control, analysis and selection of cane before cutting, effect of mosaic on yield, breeding, weed control and physiology. For separate abstracts see abstracts 3206, 3207, 3219, 3223, 3241.

3198. British West Indies Sugar Association.
British West Indies Sugar Association Handbook for 1952, pp. 74, illus. [received 1954].

The handbook contains information on B.W.I. sugar industry organizations; historical notes on the industry in the 7 territories in which the Association operates, namely, Antigua, Barbados, British Guiana, Jamaica, St. Kitts, St. Lucia and Trinidad; notes on the Imperial College of Tropical Agriculture with special reference to the Sugar Research Scheme financed jointly by the Association and the Colonial Development and Welfare Organization, and the Department of Sugar

Chemistry and Technology; an outline of sugar technological research in the B.W.I.; a review of the organization and policy of the B.W.I. Sugar Cane Breeding Station; a classification of B.W.I. sugar cane soils on the basis of soil management; a record of field research in progress or planned in the different territories; and statistics of production, consumption, prices, acreages, yields, and varietal distribution.

3199. MAURITIUS.
23rd Annual Report of the Sugarcane Research Station, Mauritius, 1952, 1953, pp. 37.

Cane breeding. Harvesting of variety trials gave the following results. The 4 Barbados varieties, 3337, 34104, 37161 and 37172 are high grade varieties of good quality and yield; both M 213/40 and M 423/41 give unsatisfactory juices, though the latter yields as well as the standard M 134/32. The old variety B.H. 10/12 is now no longer able to compete with modern varieties; promising new M varieties are 11/43, 129/43, 31/45, 24/47, 147/44.
Chemistry Division. Fertilizer trials showed that: (*a*) N gives a big response, and that an increased rate should be given to old ratoons; (*b*) most estate soils have a good supply of P; (*c*) response to K is small in all regions, but is of significance in sub-humid zones, where higher K fertilizing is essential. In lime trials, soils with a pH of less than 4·6 showed no response; liming has a detrimental effect on sugar content. Crushed basalt continued to give a much increased yield.
Botany Division. In controlling the weeds *Imperata cylindrica* and *Cynodon dactylon*, encouraging results were obtained by using sodium trichloracetate. Aretan and R 1412×187 gave similar control of pineapple disease, both treatments being most effective in a dry locality. In a test in which response to root pruning was used as a measure of resistance to *Clemora smithi* grubs, B.3337 and B.37172 were found to be more resistant than B.37161 and B.34104. In 3 trials interplanting food crops with cane had no effect on first ratoon yields.

3200. UNITED STATES DEPARTMENT OF AGRICULTURE.
The United States sugar programme.
Agric. Inf. Bull. U.S. Dep. Agric. **111,** 1953, pp. 34.

Annual sugar consumption in the United States is about 8 million tons raw value (about 7½ million tons refined sugar). About 78% is cane sugar which comes from Louisiana and Florida 6·2% (of total consumption), Hawaii 13·1%, Puerto Rico 13·5%, Virgin Islands 0·2%, Cuba 31% and other foreign sources 1·3%. The two last figures are variable under the quota system. An account is given of the United States sugar system, the history and development of the national sugar policy from 1789 to 1934, the Sugar Acts 1934 to 1953 and the results of the sugar programme. A map shows the domestic and foreign sugar cane producing areas and raw cane sugar mills and cane sugar refineries.

3201. HASKEW, H. C.
Varietal trials—1953 season.
Cane Grs' quart. Bull., 1954, **17**: 124-36.

The results are discussed of 19 plant, first ratoon and second ratoon trials conducted in various parts of Queensland.

3202. STORY, G. C.
C.P. 29/116 in the Mackay area.
Cane Grs' quart. Bull., 1954, **17**: 147-9.

Trials begun at the Central Sugar Experiment Station, Mackay, in 1948 show that the late-maturing variety C.P. 29/116, gives a good performance but should be confined to an area in which it would conveniently cover the last 6–8 weeks of the harvesting period.

3203. JAN, [M.] O., AND HUSSAIN, R.
Sugarcane varieties in the N.W.-F.P.
Agric. Pakistan, 1952, **3**: 18-21.

Brief notes are given on sugar cane growing in the North-West Frontier Province. Varietal trials at Tarnab Agricultural Research Station (Peshawar) in 1946/50 showed that the most promising canes are Co. 622 (medium-early), Co. 527 and Co. 451 (mid-season) and Co. 451 (late mid-season). They are all far superior in cane and sugar yield both in the plant and in the ratoon crop to Co. 290, the standard and most widely grown variety. Their first ratoon crops give a much greater yield (average 50% greater) than their plant crops.

3204. SHAH, S. M. I., AND JAN, M. O.
Another variety of sugarcane for N.W.-F.P.
Agric. Pakistan, 1952, **3**: 274-6, bibl. 7.

Co. 622 is an early-maturing variety with a much better cane tonnage per acre and a much better juice quality than Co. 290, the standard and most widely planted variety. It yields over 600 maunds [maund=82·3 lb.] of cane per acre containing 15–18% sucrose of 85–90% purity, and is claimed to have all the desirable agricultural characters. A detailed comparison of its performance and characters with those of Co. 290 is given.

3205. LOCSIN, C. L.
Victorias Milling Co. contribution on sugarcane varieties.
Sugar News, 1954, **30**: 59-62, bibl. 1.

H37–1953 proved the best variety for the Victorias district. Despite attacks by *Pythium* rot it maintained its supremacy over 2 other good varieties in 1951/52 and 1952/53, but its position is now being challenged by a new Hawaiian variety, H44–3098.

3206. MÉNDEZ, F.
Programa para el desarrollo y prueba de las nuevas variedades de caña de azúcar. **(Programme for the breeding and trial of new varieties of sugar cane [in Puerto Rico].)**
Memoria Conf. anu. Asoc. Téc. azuc. Cuba 1952, 1952, pp. 53-74.

A short account is given of breeding at Rio Piedras and Aguirre Experiment Stations and of recent variety trials in various parts of Puerto Rico. Canes which have proved outstanding are B 37,161, B 34,104, B 37,172, B 40,105, B 40,98, B 41,227, PR 902, PR 999, PR 1000 and the "seedlings" I 24,243 and G 34,7. Notes are given on these canes, all of which gave better performances than the standard varieties. Monthly cane and sugar yields are given for 82 varieties included in 1951/52 experiments and the total sugar yields of plant and ratoon crops in trials reaped in 1952.

3207. Fors, A. L.
Descripción de nuevas variedades de caña de azúcar en Cuba. Tercera parte. **(Description of sugar cane varieties new to Cuba. Part III.)**
Memoria Conf. anu. Asoc. Téc. azuc. Cuba 1952, 1952, pp. 75-88, illus.

Notes are given on the botanical characters, parentage and performance of the 6 Australian varieties Q.25, Q.28, Q.50, Comus, Pindar and Trojan.

3208. de Almeida, J. R.
O florescimento na variedade de caña Co-331 (Co-3X). **(Flowering in the cane variety Co. 331 (Co. 3X).)**
An. Esc. sup. Agric. "Luiz de Queiroz", Piracicaba, 1952, **9**: 157-74, bibl. 4.

In continuation of a study on flowering in sugar cane the early-flowering late variety Co. 331 was investigated, 12 fortnightly analyses being made during the period mid-June to mid-November. Data are given for Pol values, fibre content, reducing sugar content and estimated sugar percentage. It was concluded that the best time to harvest is 3–4 months after the beginning of flowering; the yield is then 50–80% greater than that obtained if cutting occurs soon after flowering has begun.

3209. Locsin, M. V.
The influence of fiber on the Java ratio.
Sugar News, 1954, **30**: 8-11, bibl. 9.

The Java ratio (sucrose percentage in cane over sucrose percentage in first expressed juice) is the basis for computing the sucrose content of individual planters' cane in the Philippines, but it is subject to wide variations due to several factors, including the fibre percentage in the cane. The exact correlation between fibre and Java ratio has never been determined. Preliminary tests in the Victorias Milling Company's laboratory showed that the wide variations in Java ratio reported by Philippine mills are mainly due to differences in fibre content.

3210. du Toit, J. L.
Sugarcane nutrition in South Africa.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 40-4.

Foliar diagnosis: Location of samples, NPK contents at different ages, optimum levels. *Soil analyses. Fertilizer:* Current practice. *Minor elements.*—S. Afr. Sugar Ass. Exp. Stat., Mount Edgecombe.

3211. Bedsole, M. R., Jr., and Breggar, T.
Some relations of chemical analyses of soil and fresh sugarcane tissue to growth and yield.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 24-40, bibl. 14.

Studies were conducted during 1951 upon (1) the selection of a sugar cane tissue most adaptable for the extraction of nutrient elements in a Waring blendor with 0·5 N acetic acid and (2) the relationships of the periodical quantitative variations of available soil and leaf blade nutrients to the yields of sugar cane and reciprocal absorption effects of nutrient accumulations in tissue. The results show good correlations of inorganic chemical analyses (NO_3–N, NH_4–N, Ca, P, K, Mg) of tissue, soil and yields. The degree of significance of correlations of analyses of leaf and soil with yields increased with crop maturity, leaf tissue analyses yielding higher significance for potassium and phosphorus relationships than soil analyses. Chemical analyses of Waring blendor extractions, expressed in percent of nutrient elements in dry material, are more consistent after the cessation of flush growth in early summer. Only slight changes occur thereafter in the quantities and proportions of essential nutrient elements. Optimum local applications of the reported analytical technique were secured by leaf blade analyses during crop maturity and by soil analyses preceding or following harvest. [From authors' summary.]—Everglades Experiment Station, Belle Glade, Florida.

3212. Lunin, J., and Aughtry, J. D.
The effect of soil type and fertilization on the growth and yield of a ratoon cane crop as indicated by crop logging.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 3-16, bibl. 14.

N, P and NP were applied to irrigated ratoon crops of P.O.J. 2878 on a silty clay loam with a low P content and a sandy loam with high P and relatively low N contents. Fertilization evoked no response on the clay. On the sand N gave a large yield increase and P none. Brix, sucrose content and yield were higher in the juice from the sandy plots. The response to fertilization on the sand and the lack of response on the clay were indicated by the growth rate measurements. Green weight of leaf sheath showed the same trend as growth rate and might serve as an index of growth potential.—Res. Dep., Ingenio Barahona, Dominica.

3213. Clements, H. F.
Crop logging of sugar cane—principles and practices.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 79-97.

Subjects discussed are the selection of index tissue, the determination of the proper levels of each nutrient, K and N nutrition, the crop log programme, fertilizer practices, irrigation control and the ripening programme.—Univ. Hawaii Exp. Stat.

3214. Burr, G. O.
Basic problems of sugarcane nutrition. 1. Absorption and distribution of tagged elements by sugarcane.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 45-51.

Experiments with tagged inorganic ions and organic compounds have led to the following conclusions: (1) Tagged photosynthate from a single leaf moves rapidly to all parts of a sugar cane stool. (2) Solutes fed through the leaves move into all parts of the plant in sufficient quantity to contribute appreciably to the nutritive requirements. (3) Nitrogen absorbed by the roots at any given time is being redistributed to new growing parts three months later. (4) All experiments with tagged elements indicate that throughout the life of the plant there is a continual mixing of solutes from all parts through a common pool. No tissue is static. It is exchanging old elements for new without altering the concentrations. [From author's conclusions.]—Exp. Stat., Hawaii. Sugar Plant. Ass., Honolulu.

3215. Aughtry, J. D., and Lunin, J.
The fertilization of certain irrigated soil types of the Dominican Republic.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 60-7.

Two fertilizer trials with P.O.J. 2878 were conducted at Barahona in Dominica on 3 soil types. The Canal sandy loam, Machete silty clay loam and Santana clay responded only to nitrogen when nitrogen, phosphorus and potash fertilizers were applied alone or in combination as surface applications. On plant cane of 22 months of age the increased tonnage obtained from even the highest rate of nitrogen fertilization was not associated with any decrease in sugar yield, whereas on ratoon cane of 13 months of age a significant decrease in sugar yield resulted from high rates of nitrogen fertilization. Studies on rate of application of nitrogen revealed that all soils and both classes of cane showed significantly greater tonnages of cane at and beyond the 100 lb. application. [From authors' summary.]—Res. Dep., Ingenio Barahona, Dominica.

3216. Yusuf, N. D., and Mohammad, W.
Nitrogenous fertilizers and sugarcane.
Agric. Pakistan, 1951, **2**: 38-43.

An account is given of 4 nitrogenous fertilizer experiments made at the Sugarcane Research Station, Lyallpur. (1) Farmyard manure (F.Y.M.) plus ammonium sulphate, and F.Y.M. plus *Brassica campestris* (toria) cake both gave significant yield increases compared with F.Y.M. alone. (2) Various oil cakes alone gave significantly higher yields than F.Y.M. alone, but toria cake plus F.Y.M., and ammonium sulphate plus F.Y.M. were cheaper. (3) Various combinations of toria cake plus F.Y.M., or ammonium sulphate plus F.Y.M. did not show marked differences in their effect on yield. (4) Cane yield increased as nitrogen was increased up to 140 lb. (70 lb. each from F.Y.M. and toria cake).

3217. Robinson, J. B. D.
A study of the potassium and phosphorus requirements of sugarcane on the coral limestone soils of Barbados.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 105-16, bibl. 28.

The manurial trial, soil analysis and leaf analysis work conducted by the Barbados Department of Science and Agriculture between 1928 and 1952 is surveyed.

3218. Schroo, H.
The fertility of sugarcane soils with special regard to phosphate.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 116-23, bibl. 17.

This review paper from Trinidad includes a section on the cane plant and its phosphate-feeding capacity. Points discussed are the mechanism of phosphate uptake, cane's phosphate requirements, phosphate as an immobile nutrient, phosphate in the top soil, phosphate placement and the phosphate-nitrogen balance. The author concludes: "The phosphate should be applied before or at planting time, by spreading granulated phosphate (preferably 40% double super) in a band at the bottom of the furrow, underneath the seed-cane, covering an area as wide as the furrow allows and to a depth of 2–3 inches. In case of high phosphate dressings it might be worth while only to apply half of the intended dosage at this time, saving the other part for a later stage of growth, say three months later. This top dressing should be applied to the place where greatest development of roots at that time may be expected. This area should preferably be a band between the rows and below 3 inches depth or in combination with banking at both sides of the row. Both applications of phosphate should be combined with a split application of nitrogen, which can be given separately shortly afterwards or at the same time as a granulated N–P mixture. On potash-deficient soils, N–P–K mixtures may be used instead. Either choice will greatly depend on time of planting and weather conditions. The same practice applies to ratoons, where the initial or total granulated phosphate dressings, in combination with part of the nitrogenous fertilizers should be added in a band on both sides of the plant and close to the old stool, at a depth of at least 3 inches below the soil surface. By this method of application, a greater benefit from smaller phosphate dressings may be obtained on phosphate-deficient soils under appropriate circumstances."

3219. Fors, A. L.
Efectos de la plicación de abonos fosfatados a cañas de primavera. **(The effects of phosphatic fertilizer on spring cane.)**
Memoria Conf. anu. Asoc. Téc. azuc. Cuba 1952, 1952, pp. 1-7.

Four levels of superphosphate were applied in replicated experiments on Pepecuca, P.O.J. 2878 and ML 3–18 on clay soil at the Hormiguero centre in 1951. The results were: (1) Pepecuca had lower leaf K and ML 3–18 lower leaf P than the other varieties; (2) yield increases were directly proportional to the amount of fertilizer applied with Pepecuca and inversely proportional with the others; (3) cane thickness was closely proportional to weight of fertilizer especially in Pepecuca; (4) yield increase was not striking in Pepecuca except at the maximum fertilizer application, while in P.O.J. 2878 yield increased progressively with increasing fertilizer and in ML 3–18 it fell progressively; (5) increase in leaf N was approximately proportional to fertilizer increase in Pepecuca; (6) increase in leaf P was approximately proportional to fertilizer increase in ML 3–18; (7) the yield increase/leaf N ratio was highly significant in Pepecuca; (8) the K/juice purity ratio was significant only in Pepecuca, in which purity increased progressively with increase in leaf P; (9) leaf N and sugar yield were directly proportional in Pepecuca and inversely so in ML 3–18; (10) though sugar yield increased with increased P fertilization in Pepecuca the % P was inversely proportional to the yield; (11) juice clarification was unaffected by up to 1·39% leaf N in Pepecuca and up to 1·37–1·38% in the other varieties; (12) juice clarification was unaffected by minima of 0·56%, 0·58% and 0·47–0·48% leaf P in Pepecuca, P.O.J. 2878 and ML 3–18 respectively.

3220. Schroo, H., and Schmidt, N. O.
The use of pot tests in research on the fertility of sugar cane soils. Paper IV: The effect of phosphate and lime on the growth, yield and quality of sugar cane.
Trop. Agriculture Trin., 1954, **31**: 161-72, bibl. 2.

Sugar cane was grown in highly acid and phosphate deficient soil to an age of 8½ months. The effects of single dose high-liming and 5 different levels of phosphate fertilizer were studied. Results showed that the soil used contained nearly sufficient available phosphate to support a cane crop, but an increase in yield was obtained from phosphate fertilizer and from liming, which increased the amount of available phosphate.

3221. Beater, B. E.
Some effects of the use of phosphates in the sugar industry of Natal and Zululand.
Bull. Docum. Ass. int. Fabr. Superph., 1953, No. 14, pp. 41-5, from abstr. in *Soils and Ferts*, 1954, **17**, No. 812.

Yields are reported of sugar cane on various, chiefly sandy, soils dressed with super at rates from 252 to 1,500 lb./acre. Not many of the results were significant and dressings tended to have depressing effects on basic igneous (dolerite and basalt) soils.

3222. Clements, H. F., and Waterhouse, A. D.
Irrigation control on a Hawaiian sugar plantation.
Agron. J., 1954, **46**: 97-8.

Each acre of cane, between its start and harvest at 2 years, needs 25-acre feet of water; it is difficult to judge the right time to irrigate, but the optimum effect is gained by watering when the soil moisture tension is about 0·20 atmospheres, measured by a "Tensiometer" or "Irrometer" embedded in the root system of the cane. When the instruments show the critical atmosphere to be approaching, arrangements for irrigation are made.

3223. Cueto Robayna, C. B.
Orientaciones sobre el regadio de la caña de azúcar. **(On irrigating sugar cane.)**
Memoria Conf. anu. Asoc. Téc. azuc. Cuba 1952, 1952, pp. 9-32, bibl. 6.

Figures are presented which show that on old Truffin clays furrow irrigation of P.O.J. 2878 increases yield greatly, reduces costs and simplifies management as compared with normal dry cultivation methods.

3224. Thompson, H. A.
A short note on recent irrigation studies at Monymusk, Jamaica.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 97-101, illus.

The main objective of recent studies on the well-drained soils of Monymusk was to determine to what extent moisture content can be raised between irrigations without impairing sugar yields. Gypsum resistance blocks plus evaporation tank data appear to provide the best means of determining irrigation intervals. In a pilot trial with B.41227 the yield with irrigation at low tension (55 tons cane per acre) was much greater than at high tension (43), a result which suggests that it may be important to maintain active growth without check during the "grand" period of growth.—W. I. Sugar Co. Ltd., Jamaica.

3225. Baver, L. D.
Factors affecting sugar yields in Hawaii.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 56-60.

Sugar yields per acre in Hawaii rose from 5 to nearly 9 tons in the period 1910–1950. Yields were no higher in 1920 than in 1910, rose spectacularly between 1920 and 1930, were constant from 1930 to 1940 and rose sharply between 1940 and 1950. The increase in the 1920/30 period was due primarily to changes in variety but also to the following factors in descending order of importance: cultural practices, fertilizer practices, and pest control. That in the 1940/50 period was also due primarily to varietal changes, and then to the following in descending order: weed control, soil improvement (manures and irrigation), good planting material, and cultural practices.

3226. Wilson, T. B.
The economics of peasant cane farming in Trinidad.
World Crops, 1954, **6**: 135-40, illus.

In Trinidad, where sugar forms two-thirds of the annual agricultural export, peasant cane farmers cultivate half the total cane acreage and produce one-third of the total crop. Holdings are generally less than 5 acres and are cultivated extensively; land is usually rented, and the rent is low. Standards of cultivation are poor: the cane farmer is not usually a full-time agriculturist, and many incomes are supplemented by outside earning. The factories have a monopoly for buying cane over certain areas, but the organization of harvesting is haphazard. At the moment peasant cane farming is uneconomic in the use of land and methods and improvement in organization of both individual holdings and the industry as a whole is needed.

3227. Anon.
Abrex mechanical planter.
S. Afr. Sugar J., 1954, **38**: 109, illus.

Three illustrations are given of this planter developed by the South African Sugar Association. The machine can be direct-mounted on a wheeled or crawler tractor or attached to a trailer unit coupled to the hydraulic mechanism of a tractor.

3228. Silva, E., and Piñero, M.
La eficiencia del trabajador en la recolección de la caña de azúcar en Puerto Rico, 1950. **(Labour efficiency in sugar cane harvesting in Puerto Rico in 1950.)** [English summary 1¾ pp.]
Bol. Estac. exp. agric. Rio Piedras **112,** 1953, pp. 33.

In Puerto Rico manual labour accounts for about half the total cost of sugar cane growing and harvesting. An account is given of a study undertaken to determine the output per man-hour in each of the harvesting operations and the factors affecting labour efficiency and to make recommendations for the more efficient use of labour. Cutting took 2·5 man-hours per ton, loading 1·5 and hauling to loading station 0·3. The major factors affecting labour efficiency were yield per unit area and the topography of the fields.

3229. Smith, N. M.
A front-end cane loader.
Cane Grs' quart. Bull., 1954, **17**: 142-3, illus.

An improved front-end cane loader that has been developed in Australia operates in a manner similar to other types but the head or movable top jaw is hydraulically operated and can be closed, opened and locked in any position.

3230. (Maclean, A.)
Kinnear harvester on trial. Preliminary report on Mauritius tests.
S. Afr. Sugar J., 1954, **38**: 103-5, illus.

A description is given of the Australian Kinnear harvester and of trials in Mauritius. The machine was developed primarily to deal with burned cane and cuts, tops and lays only.

3231. Landrau, P., Jr., and others.
Leaving sugarcane trash undisturbed on a lateric soil compares favourably with currently used trash-disposal methods.
J. Agric. Univ. Puerto Rico, 1954, **38**: 1-8, bibl. 4.

The production of sugar was not influenced by the various methods of handling sugar cane trash (aligning, aligning and furrowing, leaving undisturbed or burning) on highly permeable lateritic soil in Puerto Rico. There were no significant differences in the soil composition. By leaving the trash undisturbed, however, cultivation costs and direct moisture evaporation losses can be reduced. [From authors' summary.]

3232. Rehbein, C. A.
Salt water damage at Moreton.
Cane Grs' quart. Bull., 1954, **17**: 145-6, illus.

Salt water flooding of a few days' duration caused foliage burning and apparent death. In most fields the cane revived after a fortnight and made rapid growth.

3233. Lauden, L. L., and Nugent, L.
Hot air treatment of sugarcane in an effort to control stunting disease.
[*Cyclostyled Reprint Proc. Amer. Soc. Sugarcane Tech.*], Feb. 1954, pp. 3.

A mobile hot air unit has been tested in Louisiana with a view to controlling the [ratoon] stunting virus in sugar cane setts. Some data are provided on the construction and operation of the unit, and difficulties experienced in obtaining a uniform temperature of 129° F. throughout the chamber are discussed. Tests are in progress on Co. 290 and several CP varieties.

3234. King, N. J.
Progress in control of ratoon stunting disease.
Aust. Sugar J., 1953, **45**: 484-6.

The 1953 planting season saw the start of a campaign by a number of Queensland Cane Pest and Disease Control Boards to eradicate ratoon stunting disease by the hot water treatment of selected planting material. The organization of the campaign and the satisfactory progress made to date are outlined.

3235. van Dillewijn, C., and Lopez, M. E.
Leaf scorch of sugar cane.
Sugar News, 1954, **30**: 73-4, bibl. 7, illus.

A description is given of leaf scorch (*Stagonospora sacchari*), first discovered in China in 1949. H 37–1933, the standard variety in the Victorias district of the Philippines, is badly affected, especially during the season of heavy rains.

3236. Johnson, L. F.
Antibiosis in relation to pythium root rot of sugarcane and corn.
Phytopathology, 1954, **44**: 69-73, bibl. 9, illus.

A study was made of the effect on pythium root rot of sugar cane and corn of antagonistic soil micro-organisms; these were isolated and tested for antibiosis to *Pythium arrhenomanes*. Isolates of many different genera, especially actinomycetes, produced antibiotics which inhibited the fungus. Greenhouse tests showed significant control of pythium root rot of corn; there was a correlation between the magnitude of the zone of inhibition produced by the actinomycetes in culture and their ability to control root rot. With non-antagonistic micro-organisms, no isolates consistently controlled the disease.

3237. Williams, J. R.
Pests of sugar cane.
A.R. Mauritius Dep. Agric. 1952, 1953, p. 35.

The spotted borer (*Proceras sacchariphagus*). Collections of larvae failed to reveal parasitism by *Agathis stigmaterus*, introduced last year. *The pink borer* (*Sesamia calamistis*). Releases of *Apanteles sesamiae* adults (an important predator of the maize stalk borer in Africa) were made and by the end of the year parasitism of *Sesamia* larvae had been observed in several localities. *The white grub* (*Clemora smithi*). An attempt (the second) to introduce the predacious *Bufo marinus* has apparently failed.

3238. Anon.
Raising cane with chlordane.
Agric. Res., 1954, **2** (9): 16.

Sugar cane yields were raised by more than 12% in Louisiana by controlling soil pests by applying chlordane to setts in the planting furrow. In the second year increases were 20% to 30%.

3239. Martorell, L. F., and Bangdiwala, I. S.
Sucrose content of sugarcane as affected by moth-borer, *Diatraea saccharalis* (Fabricius), infestation.
J. Agric. Univ. Puerto Rico, 1954, **38**: 22-37, bibl. 7.

Samples of sugar cane were graded according to damage and their juices analysed, in an attempt to estimate damage done by *Diatraea saccharalis* in Puerto Rico. In the 12-year period 1940 to 1951, it is estimated that the average annual loss caused was $2,500,000.

3240. Martorell, L. F., and Burleigh, C. H.
Ineffectiveness of the overhead-irrigation method for the application of insecticides to control the sugar cane moth stalk-borer, *Diatraea saccharalis* (Fabricius).
J. Agric. Univ. Puerto Rico, 1954, **38**: 38-60, illus.

Experiments were made in Puerto Rico in 1950 and 1951, using an overhead irrigation system as a means of applying insecticides, in an attempt to control the sugar cane moth stalk-borer. Thirteen insecticides at two concentrations were used; they were applied at 15-day intervals, and there were four sprayings each year. Results showed that these insecticides, used in this way, were completely ineffective.

3241. Fortún, C. M.
Control biológico del borer en el Central Cuba, de 1950 a 1952. **(Biological control of the sugar cane borer at the Cuba Central in 1950/52.)**
Memoria Conf. anu. Asoc. Téc. azuc. Cuba 1952, 1952, pp. 33-7.

In the 3-year period more than 100,000 specimens of *Lixophaga diatraeae* were released. The cane borer infestation index fell from 16·72 in 1951 to 13·68 in 1952 and was expected to be much lower in 1953.

3242. Bouvet, E.
L'utilisation du surplus de bagasse. **(The use of surplus bagasse.)**
Rev. agric. Maurice, 1954, **33**: 5-12, bibl. 2.

After a general consideration of the uses of bagasse it is recommended that Mauritius surplus should be used as a fuel in factories and distilleries, as the raw product in a projected paper mill, for charcoal and, after impregnation with distillery waste liquors, as an organic manure.

Tea.

(*See also* 2164, 3269i, j, p-r, x, z, 3270j, p.)

3243. Wight, W., and Barua, P. K.
Morphological basis of quality in tea.
Nature, 1954, **173**: 630-1, bibl. 2.

In breeding work on tea at the Tocklai Experimental Station a correlation was found to exist between quality and two morphological characters, viz. pubescence of the leaf and the degree of red anthocyanin pigmentation of the leaf petiole.

3244. Bahtadze, K. E.
A new large leaved form of the tea plant. [Russian.]
Agrobiologija, 1953, No. 1, pp. 97-100, illus.

On a China tea plantation of an experiment station in Georgia, one of the selected plants pollinated with mixed pollen of the best bushes produced some vigorous hardy specimens with very large (180 × 100 mm.) good quality leaves. The new type is well adapted to vegetative propagation.

3245. Indian Tea Association.
A guide to Tocklai.
[*Publ.*] *Indian Tea Ass.*, 1952, pp. 54.

"The reason for this publication is to allow readers to gain a true idea of the Scientific Department, its activities, development and size, and to indicate by a description of the different Branches in which direction information may be sought from the Department."

3246. Harrison, C. J.
Progress in the tea industry in North East India.
World Crops, 1954, **6**: 181-4, illus.

The history of tea-growing in India is surveyed; cultural practices are described; pest and disease control and manufacture are also mentioned.

3247. Lamb, J.
The Tea Research Institute of Ceylon.
World Crops, 1954, **6**: 185-8, illus.

The work of the Tea Research Institute is reviewed. Research on tea manuring and on pest and disease control is outlined. Plucking and pruning, and processing and preparation are dealt with more briefly.

3248. Portsmouth, G. B.
The improvement of Ceylon tea.
World Crops, 1954, **6**: 199-202, illus.

The selection and propagation of clones in St. Coombs experimental nursery, Ceylon, is described. Such clones have the advantages of higher potential yields, rapid growth, uniformity, blister blight resistance and eelworm tolerance.

3249. Lamb, J.
Tea as a crop for small holders in Ceylon.
World Crops, 1954, **6**: 206-7, illus.

The standard of culture on tea smallholdings in Ceylon is low; more attention is needed by the crop than the average smallholder will give. Standards may be improved by the organization of co-operative societies.

3250. Eden, T.
Tea research problems in East Africa.
Trop. Agriculture Trin., 1954, **31**: 112-18, bibl. 10.
The tea industry of East Africa.
World Crops, 1954, **6**: 203-5, bibl. 9, illus.

The problems of serving widely scattered and differing tea growing areas in East Africa are discussed. The Tea Research Institute is currently doing research on cultural problems, selection and vegetative propagation, pathological problems and manufacture. The industry itself is only about a generation old, but is expanding rapidly.

3251. Nyasaland Protectorate.
Annual Report of the Nyasaland Department of Agriculture for the years 1952 and 1953, Part II, Section on Tea Experiments, 1954, pp. 17.

This section of Part II of the Nyasaland Department of Agriculture's annual reports for 1952 and 1953 is printed by the Nyasaland Tea Association to obviate otherwise unavoidable delay in publication. It records nursery, establishment, pruning, tipping, plucking, manuring, spacing, weeding and shading experiments. Among the results are the following. *Nursery*. Pit *v.* bed sowing: germination in pits before transfer to beds gave larger seedlings than bed sowing; it was found better to use seeds more than ½ in. in diameter and to reject those which did not sink after 2 hours' immersion. Stem diameter and root weight of nursery seedlings ready for planting out: stem diameter at 18 months old is a good indication of root weight (high root weights and hence good starch reserves being desirable). *Establishment*. Stem diameter, root weight and survival of transplanted stumps: percentage of deaths was negatively correlated with stem diameter. *Pruning*. Length of cycle and type of prune (poor Indian Jat): a 3-year clean-prune yielded significantly more than a 2-year clean-prune and the 2-year clean-prune significantly more than an annual clean-prune; yields from 3 cut-across treatments were not significantly different and were all significantly better than annual clean-prune. Yields: in a 12-year-old experiment in which 2- and 3-year cycles, and clean-prune and cut-across are compared, the shorter and cut-across cycles tended to give higher yields in the earlier years but it now appears that the position is being slowly reversed; in the 3-year cycles yields rise to a maximum during the first half, then fall away. *Tipping*. Yield: both Indian and local Jat show no yield difference between 4 in., 6 in. and 8 in. tipping. Wood formation: as between these 3 tipping heights greater height gave greater wood formation within the bush framework. *Plucking*. Duration of round: the 6- and 10-day rounds have given a significantly greater total yield for the 3-year period of the experiment than the 14-day round, but do not differ significantly from one another; response to shorter rounds appears to be more pronounced in vigorous than in poor crop seasons. Quality: deteriorated with each increase in length of round. *Manuring*. In general N increases gave significant yield increases with mature, but not with young, tea, and P and K gave no significant differences; elemental sulphur and sulphate both cured yellows. *Spacing*. A 14-year-old Swazi experiment ($3\frac{1}{2}\times3\frac{1}{2}$, 4×4, $4\frac{1}{2}\times4\frac{1}{2}$, and 5×5 ft.) showed significant yield increases with closer spacing for the first 10 years; it suggested that, within the experimental limits, spacing has a direct bearing on mature tea yields also and that doubling the number of plants per acre gives 30% more yield. *Weeding*. Yield under various covers: yield was highest with clean weeding, followed by no weeding and then by other treatments including grassing. NPK: increasing N appears to increase the grass/dicotyledonous weed ratio, and increasing P and K to reduce it. *Shading*. For the fourth successive year yield of mature tea was greater with permanent shade than with no shade.

3252. Sprinks, F. O.
Tea planting in Mauritius.
Rev. agric. Maurice, 1954, **33**: 13-19.

Notes are given on rainfall, land clearance, holing, planting, pruning (stumping or pegging), weeding, cultivation and manuring, plucking, cover crops (*Tephrosia candida* the best), and shade trees (*Erythrina lithosperma* and *Albizzia stipulata*).

3253. Newton, G. K.
Prospects for tea production in Papua and New Guinea.
Papua N. Guinea agric. Gaz., 1953, **8** (2): 57-61, being extracts from a report.

The territory is suitable for tea growing but an adequate labour supply is available only in the districts of Madang, Western Highlands, Eastern Highlands and Morobe. 20,000–25,000 acres could be cultivated by the available labour. Large-scale plantations should be confined to flat land where maximum mechanization of routine work is possible. Selections from the Garaina seed garden would provide suitable material.

3254. McIlroy, R. J., and Glover, P. M.
Mechanisation in the tea industry in northern India.
World Crops, 1954, **6**: 189-92, illus.

Mechanization of tea growing in north India will be slow, as the spacing in old gardens is not suitable for machines. Experiments with plucking machines have so far not been very promising. Soil cultivation by machine is now usual, as is mechanical transport of the leaves to the factory. [See also *H.A.*, 24: 1006.]

3255. van der Meer, H. J.
Scharenpluck op de theeonderneming Malabar-Tanara. (**Razor-plucking on the "Malabar" tea estate.**)
Bergcultures, 1954, **23**: 63-73.

Under Pengalengan (Indonesia) conditions the plucking of tea by a razor-like instrument seemed promising. The output per worker was increased, costs of plucking were reduced and an even surface was left, thereby making blister blight control easier.

3256. G[lover], P. M., and D[utta], S. K.
Medium pruning.
Ser. Tea Res. Inst. Tocklai **53/1,** 1953, pp. 3.

Objects, height, method and time of medium prune (cut-back prune), initial growth to plucking level, subsequent pruning, prevention of sunscorch, manuring and prophylactic treatment.

3257. Anon.
A note on irrigating a tea nursery.
World Crops, 1954, **6**: 208, illus.

By a system of channel irrigation, young tea plants are enabled to go through hot weather without any shade at a nursery in S. India.

3258. G[lover], P. M., D[utta], S. K., and S[armah], K. C.
Hail damage on tea estates.
Ser. Tea Res. Inst. Tocklai **36/1,** 1953, pp. 3.

Prophylactic treatment of hail-damaged tea with a copper fungicide, cultural and manurial treatment of hail-damaged tea, and useful precautionary measures are discussed.

3259. Huysmans, C. P.
Een eenvoudige micro-koperanalyse, gebruikt bij fungicidenproeven in thee. (**A simple micro-copper method of analysis, used in fungicide tests on tea.**) [English summary $1\frac{1}{4}$ p.]
Arch. Theecult., 1953, **18**: 207-22, bibl. 5.

A new method of copper determination is described, which has the advantage of simplicity and can be used by unskilled workers in a field laboratory. The principle of the method depends on the catalytic reaction of copper ions in the presence of thiosulphate, which considerably accelerates the reduction of ferric to ferrous solutions. The disappearance of the ferric ions is shown by the change of thiocyanate from red to colourless. Decoloration times are timed by stop-watch.

3260. de Jong, P.
Recent developments in the control of blister blight of tea in South India.
Plant Prot. Overs. Rev., 1954, **4**: 58-63.

See *H.A.*, 23: 1351, 23: 2363, 24: 999 and 24: 1010 for previous accounts of the investigations here described, namely, fungicidal protection of tea recovering from pruning, power dusting and power spraying.

3261. S[armah], K. C., and G[lover], P. M.
Branch die-back and *Nectria*.
Ser. Tea Res. Inst. Tocklai **65/1,** 1953, pp. 4.

Notes on branch die-back caused by the wound parasite and saprophyte, *Nectria* spp. Curative control is by pruning infected branches between mid-November and the end of December, but at no other season, followed by spraying within 24 hours with a 5% solution of tar distillate or Ovicide. Prophylactic measures are also outlined.

3262. S[ARMAH], K. C., AND G[LOVER], P. M.
The prevention and cure of red rust.
Ser. Tea Res. Inst. Tocklai **61/1**, 1953, pp. 7.

Effects, origin of attack, favourable conditions, cultural control by shade, fertilizers, attention to soil reaction and drainage, pruning and the use of green crops, and chemical control, copper fungicide being used as a palliative and prophylactic, are outlined with reference to the control of the red rust alga *Cephaleurus parasiticus.*

Cover crops.

3263. D[UTTA], S. K., AND G[LOVER], P. M.
Crotalaria anagyroides.
Ser. Tea Res. Inst. Tocklai **40/1,** 1953, pp. 5.

Description of the plant; collection, storage and sowing of seed; cultural practices; pests and diseases.

Sundry crops.

(*See also* 2332.)

3264. FAZLULLAH KHAN, K., AND SAMBASIVA RAO, I. K.
A note on the vegetative propagation and clonal performance in custard apple (*Annona squamosa* L.).
Indian J. Hort., 1953, **10**: 140-4, bibl. 7, illus.

In a custard apple rootstock trial laid down at Kallar Fruit Station (Madras) in 1948, scions from a selected tree were inarched on custard apple (100% success), *Annona reticulata* (100%), *A. muricata* (100%) and *A. palustris* (75%). All *A. muricata* and *A. palustris* plants died within 8 months. In 1953 custard apple on *A. reticulata* showed better stock girth, scion girth, and height, and much better yield than custard apple on custard apple. Unworked seedlings came into bearing later and gave lower yields than the grafted plants.

3265. JOSHI, N. V., AND JOSHI, S. G.
Experiments on the control of the "band" disease of Areca palms.
Sci. and Cult., 1954, **19**: 387-91, bibl. 8.

"Band" is a disease of the arecanut palm (*Areca catechu*) occurring in Bombay State, which renders the palms sterile. The symptoms are dwarfing of the new shoots and leaves, and darkening green colour. Its cause is not yet known, but experiments were made on the supposition that it might be nutritional. Soil application of 25 g. copper sulphate plus 25 g. lime per palm gave 100% recovery in 18 months. Further investigations are being made with zinc sulphate and boric acid.

3266. SINGH, L. B.
Top working of aonla (*Phyllanthus emblica*).
Indian J. Hort., 1953, **10**: 59-61, bibl. 3, illus.

Wild trees of aonla were headed back to 4 ft. in March and developing shoots shield budded in June. Trees of 15, 8 and 4 years were used, but it was shown that bud take bore no relation to age of tree. The increase in growth and girth of the subsequent shoots was greater in the older trees. Thus it is possible to top work inferior aonla seedling trees irrespective of their age with scions of improved varieties.

3267. SINGH, L. P.
Propagating bael (*Aegle marmelos*) vegetatively.
Sci. and Cult., 1954, **19**: 405-6, bibl. 2, illus.

Budding *A. marmelos* in June with budwood from 1-month-old scions gave 80% take. The buds were put onto 2-year-old stocks grown in beds. If the stocks are grown in pots to facilitate transplanting, it will take 3 to 4 years before they are fit for budding.

3268. WINTERS, H. F.
The mangosteen.
Fruit Var. hort. Dig., 1953, **8**: 55-6.

The distribution of the mangosteen, *Garcinia mangostana*, is discussed and short cultural notes are given. The seeds, which are short-lived, cannot be stored at low temperature to prolong viability. [See also *H.A.*, 24: 1014.]

Noted.

3269.

a ADSUAR, J.
Further studies on the mosaic of the sugarcane variety Mayaguez 336.
J. Agric. Univ. Puerto Rico, 1954, **38**: 16-21, bibl. 1.

b AIYADURAI, S. G.
A note on the food value of *Bassia* (ilippi) flowers.
S. Indian Hort., 1954, **2**: 26-7.
Analyses of the flowers of *Bassia longifolia* are given.

c BAVER, L. D., AND HUMBERT, R. P.
Irrigating sugarcane in Hawaii.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 52-6.

d BRUEHL, G. W.
Strains of sugarcane mosaic in Puerto Rico.
Plant Dis. Reptr, 1953, **37**: 479-81, bibl. 9.

e CALLE, H.
Estado actual de los trabajos sobre propagación de microorganismos alimenticios en pulpa y mucílago del cafe. **(Present position of research on the propagation of the micro-organisms of coffee pulp and mucillage.)**
Bol. inf. Colombia, 1954, **5** (50): 22-9, bibl. 5.

f COCONUT RESEARCH INSTITUTE CEYLON.
How to make a barbecue.
Leafl. Coconut Res. Inst. Ceylon **20**, 1953, pp. 3, illus.
A concrete platform for sun-drying copra.

g CUATRECASAS, J.
Une nouvelle espèce de *Theobroma.* (**A new species of *Theobroma*.**) [English summary 7 lines.]
Rev. int. Bot. appl., 1953, **33**: 562-5, bibl. 7, illus.
Theobroma gileri discovered in the forest of Esmeraldas in western Ecuador.

h CUTTER, V. M., Jr., AND FREEMAN, B.
Development of the syncytial endosperm of *Cocos nucifera*.
Nature, 1954, **173**: 827-8, bibl. 5.

i D[AS], G. M.
Control of mound-building termites.
Ser. Tea Res. Inst. Tocklai **52/1,** 1953, pp. 2.
With BHC or DDT dust washed down with water.

j D[AS], G. M., AND S[ARMAH], K. C.
Control of pests and diseases of boga medeloa (*Tephrosia candida*).
Ser. Tea Res. Inst. Tocklai **44/1,** 1953, pp. 4.

k DATTA, R. M.
A branched inflorescence of banana, *Musa sapientum* Linn. (*paradisiaca* Hook.) var. Kanchkala.
Indian J. Hort., 1953, **10**: 112-14, bibl. 7, illus.

l DAVIS, T. A.
Flower bunch yields numerous coconut seedlings.
Bull. Indian centr. Coconut Cttee, 1954, **7**: 202-3, illus.
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Selection of the oil palm (*Elaeis guineensis*) in Africa.
Trop. Agriculture Trin., 1954, **31**: 133-48, bibl. 5.
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Nuevos aspectos para la selección del cacao en Colombia. (**A new approach to cacao selection in Colombia.**)
Cacao en Colomb., 1952, **1**: 5-30, bibl. 28, illus.

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Ser. Tea Res. Inst. Tocklai **59/1,** 1953, pp. 4.
Using *Tephrosia candida.*

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Ser. Tea Res. Inst. Tocklai **43/1,** 1953, pp. 3.

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Ser. Tea Res. Inst. Tocklai **25/1,** 1953, pp. 2.
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El efecto del mosaico sobre la producción de azúcar en la variedad B 34104. (**Effect of mosaic on yield of B 34104.**)
Memoria Conf. anu. Asoc. Téc. azuc. Cuba 1952, 1952, pp. 47-51.
A Spanish version of the paper to which *H.A.*, 23: 4690 relates.

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Mutations in the Cavendish banana group.
Trop. Agriculture Trin., 1954, **31**: 131-2, bibl. 3.

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Inbred Line-8, an improved Solo papaya.
Hawaii Fm Sci., 1954, **2** (4): 7.

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The irrigation of sugarcane as practised in Haiti and suggestions for possible research and improved efficiencies.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 68-71, bibl. 1.

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Basic problems of sugarcane nutrition. II. Applying basic facts in sugarcane fertilization.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 71-9, bibl. 2, illus.
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Tea research in southern India.
World Crops, 1954, **6**: 195-8, illus.
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Fruit preservation industry in India.
Poona agric. Coll. Mag., 1954, **44**: 153-62.
Notes on problems and prospects for tropical and deciduous fruit.

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A note on the mechanisation of tea cultivation in Ceylon.
World Crops, 1954, **6**: 193-4, illus.
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The irrigation of sugar cane.
[*Cyclostyled Reprint Proc. Amer. Soc. Sugarcane Tech.*], Feb. 1954, pp. 5.
Including costs.

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Sugarcane research in Mauritius in 1952.
Rev. agric. Maurice, 1954, **33**: 28-48.
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La deficiencia del zinc en los almacigales de café. **(Zinc deficiency in coffee nurseries.)**
Suelo Tico, 1952, **6**: 298-300.
And its control.

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Virus diseases of plants in Ceylon.
World Crops, 1954, **6**: 249-50, bibl. 3.
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Plant Introduction and Quarantine Station, Fiji.
Agric. J. Dep. Agric. Fiji, 1953, **24** (1/2): 18-29, bibl. 24, illus.
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Abstr. in *Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953*, 1954, p. 104.

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Germinación del polen de cacao, crecimiento del tubo polínico y cuajamiento. **(Pollen germination, pollen tube growth and fertilization in cacao.)**
Agric. trop. Bogotá, 1953, **9** (10): 19-24, bibl. 27.
A short version of the paper to which *H.A.*, 23: 3527 relates.

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Occurrence of two new looper caterpillars on coffee in South India.
Indian Coffee, 1954, **18**: 35-7, bibl. 10, illus.
Biston suppressaria and *Elphos hymenaria*; their caterpillars attack the leaves.

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The sugar industry in India.
World Crops, 1954, **6**: 239-42, illus.
Its expansion over the last 20 years.

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Withering and its relation to quality.
Ser. Tea Res. Inst. Tocklai **55/1**, 1953, pp. 3.

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The nitrogen content of sugarcane as influenced by moisture and age.
Proc. 8th int. Soc. Sugar Cane Tech. Congr. 1953, 1954, pp. 16-24, bibl. 10.
See *H.A.*, 23: 4681.

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Sugar cane breeding in Australia.
World Crops, 1954, **6**: 147-8, illus.

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Report on a visit to Dominica, B.W.I. 7th-22nd November 1951.
A.R. Dominica Dep. Agric. 1951, pp. 42-9 [received 1954].
To investigate possibilities of biological control of *Cosmopolites sordidus* and other pests.

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A survey of the Cavendish group of bananas.
Trop. Agriculture Trin., 1954, **31**: 126-30, bibl. 26.
An annotated list of the Cavendish group of bananas is given.

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The Indian gooseberries.
S. Indian hort., 1954, **1**: 121-4, bibl. 9.
Notes on *Phyllanthus emblica* and *P. acidus* and their uses. See also abstract 3266.

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The tea industry of the world.
World Crops, 1954, **6**: 179-80.

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Preliminary studies on the utilization of copra meal for plastics.
Philipp. J. Sci., 1953, **82**: 1-8, bibl. 25.

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Dothidella uleï en de rubbercultuur op het westelijk halfrond en in Z.O.-Azië. **(*Dothidella uleï* and rubber growing in the western hemisphere and in S.E. Asia.)** [English summary ½ p.]
Bergcultures, 1954, **23**: 55-61, 93-103, bibl. 20.

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Investigations of the AVROS Experiment Station on the classification of natural rubber on the basis of its dirt content.
Arch. Rubb. Cult., 1954, **31**: 15-23.

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The sugar cane as a source of industrial chemicals and materials.
J. agric. Soc. Trin. Tob., 1953, **53**: 407-22.
A short version of the paper to which *H.A.*, 24: 2065 refers.

NOTES ON BOOKS AND REPORTS.

Books.

3271. BARTH, T., AND WEINHAUSEN, K.
Die Kultur der Blumenzwiebeln und -Knollen.
(The cultivation of bulbs and corms.)
Paul Parey, Berlin and Hamburg, 1954,
$8\frac{1}{2}\times 6$ in., pp. 120, illus., bibl. 12, DM. 8.40,
being *Gärtnerische Berufspraxis*, Heft **27.**

In their sub-title "propagation, raising, storage" the authors make it clear that they are addressing not the amateur gardener who wants to improve his bulb garden, but the comparatively few nursery men who supply the home market in Germany. In view of the similarity of conditions in the two countries and of the scarcity of technical books on bulb growing in English, the publication of this short handbook should be welcome also in England. In both countries it has been shown that home-grown bulbs can be satisfactory, and that what is needed is encouragement, expert advice and the co-operative organization of small growers. The book under review should go some way towards helping the industry to establish itself on a wider basis. Following a historical introduction and a chapter on the climatic, soil and cultural requirements of bulbs and corms the authors deal in detail (pp. 23-89) with the propagation, raising and storage of the following plants: tulip, hyacinth, narcissus, crocus, scilla, anemone, ranunculus, tuberous-rooted begonia, gladiolus, dahlia, iris, lily. The rest of the book is taken up almost entirely (pp. 89-115) with pests and diseases.

V.H.G.

3272. BLUNCK, H.
Handbuch der Pflanzenkrankheiten. Bd V, Tierische Schädlinge an Nutzpflanzen 2. Teil, Lief. 2. Coleoptera. **(Handbook of Plant Diseases Vol. V, Insect pests of crop plants, Part 2; Sect. 2, Coleoptera.)**
Paul Parey, Berlin, 1954, 10×7 in., pp. 599, bibls., illus., DM. 144.

The very welcome new edition of Section 2 of the second part of Volume V of this renowned work confines itself to the injurious species of the vast order of Coleoptera and their host plants.

The volume is edited by Professor H. Blunck, assisted by the following well-known authorities on the order as signified by the following. Dr. G. Dosse, Professor K. Fredericks, F. Heikertinger, A. Horion, Professor H. Kemper, R. Kleiner, Dr. H. Mühlmann, Dr. G. Schmidt, Dr. E. Speyer, H. E. Wichmann, Dr. E. von Winning and Dr. Fr. Zacher.

In order to obtain some conception of the importance of the Coleoptera and their association with agricultural, horticultural and forestry plants and trees, and also various other plants, it should be noted that the species included are contained in no less than thirty-seven families, each being arranged according to the modern European classification. The fact that the scientific index of species extends to forty pages indicates the large number of species mentioned in the text. As with earlier volumes, the very large collection of references, which appear on the lower half of each page, is a salient feature of the work. In them are listed investigations of the workers of many nations. Another important aspect of the literature cited is that after many individual references, a further reference is given in brackets to the review which can be found in the *Review of Applied Entomology*. This is invaluable when the original article appears in a language unknown to the English reader.

Many species of Coleoptera not mentioned in the earlier edition are included, and the editor and the numerous specialists are to be congratulated on bringing together under one cover reference to so much of the recent research work in relation to the Coleoptera associated with cultivated plants.

It is curious that Hop Root Weevil (*Epipolaeus caliginosus* F.) is not mentioned with the other hop beetles, but this minor omission does not detract from a work which contains a fund of information invaluable to economic entomologists, agriculturists and horticulturists everywhere.

A.M.M.

3273. BONNER, J., AND GALSTON, A. W.
Principles of plant physiology.
W. H. Freeman & Co., San Francisco,
1952, $9\frac{1}{2}\times 6$ in., pp. 499, bibls, illus., 47s.

The authors claim to have produced an elementary textbook for students of applied plant physiology and for those whose interests are more academic. In this they have been quite remarkably successful in steering between the *Scylla* of popularization and the *Charybdis* of specialist literature and have produced a comprehensive and well-balanced textbook of reasonable size which it is a pleasure to read. In an attempt to cover the whole field of plant physiology in some 480 pages it is inevitable that long discussion as to the relative values of conflicting evidence must be abbreviated and thus the final summing up must in most cases rest with the authors. The suggestions for further reading at the ends of the chapters do much to compensate for this.

As is only to be expected in so ambitious an undertaking, minor faults can always be found. Thus the section on the movement of water in the stem, for example, might be amplified with advantage, but a detailed criticism would be out of place in a short review.

To summarize: The book can be wholeheartedly recommended; in fact, had the reviewer not access to a library copy, he would have been compelled to purchase it out of his own pocket!

B.D.B.

3274. CHATT, E. M.
Cocoa, cultivation, processing, analysis.
Interscience Publishers Ltd., New York and London, 1953, $9\times 5\frac{1}{2}$ in., pp. xiv+302, bibl. 56, illus., \$8.50 or 58s., being *Economic Crops*, Vol. **3.**

The author attempts to cover most aspects of the cocoa industry, including history, botany, cultivation, fermentation, and the manufacture of chocolate and other products, in a single volume of 300 pages. About half of the book deals with the plant and half with the products. The result is a book in which information is too condensed to hold the interest of the general reader, and too superficial to be of much value to either the cultivator or the manufacturer. The editor's

Introduction suggests that the chapters on manufacturing processes are intended for the agriculturist and those on cultivation for the technologist and manufacturer, so that each may get a wider understanding of the part he plays in the industry, but the reader is likely to judge the standard of the whole book by the treatment of his own subject.

The botanical and cultural chapters contain errors of fact, such as the statement that "All cacao trees are interfertile" (p. 23). Wide spacing may facilitate spraying and some other operations, but certainly not weed control (p. 49). The equation "self-compatible" with "homozygous", and "self-incompatible" with "heterozygous" (p. 23) must prejudice the biologist against relying on information in the technological chapters. It cannot be said that all the illustrations are well chosen. The line drawing of a cacao leaf (Fig. 4) and the microscopical features of cacao seeds (Fig. 7), extremes of simplicity and complexity, both occupy space that could be put to better use.

A peculiarity, which will annoy readers who wish to enquire more deeply into a subject, is the frequency with which references are given to brief reports with limited circulation, instead of to full papers in scientific journals. For a book of this calibre 58s. seems a high price. A.F.P.

3275. Commercial Grower
The Commercial Grower Year Book and Diary, 1954.
Benn Bros., Fleet Street, London, 1954, 8×6 in., pp. 257, 10s. 6d.

Used with care this reference manual will be found invaluable to those connected with commercial and advisory horticulture in the U.K.

Among other useful items of information are lists of: Growers Associations, Official Horticultural Bodies, N.F.U. Horticultural Offices, Horticultural Training Centres, Fruit and Vegetable Grades, Horticultural Publications, the National Horticultural Advisory Service Centres, fruits in commerce, acreages, etc., etc.

3276. Dansk Gartnerforening (Danvig, A. M., and Pedersen, K.).
Årbog for Gartneri 1953. **(Horticultural Year Book 1953.)**
S. L. Møllers Bogtrykkeri, Copenhagen, 1954, pp. 257, Kr. 5.

Following the usual pattern the first part of the Yearbook, pp. 3-127, is a directory of Danish horticulture presenting information on research stations, trade associations, schools, journals, and other items as well as figures on imports, exports, production, etc. The second part consists of reports on small-scale trials carried out by commercial growers under the auspices of the Danish Market Gardening Association. Abstracts of the more important of these papers will be found in the appropriate sections of this number of *H.A.*

3277. Dawson, R. B.
Practical lawn craft.
Crosby Lockwood, Lond., revised 1954, 9×5½ in., pp. 320, bibl. 21, illus., 21s.

Mr. Dawson's book, the 3rd edition of which was reviewed in this journal [*H.A.*, 19: 2576], appears again in the same economical practical make-up but having undergone considerable modification in detail. Parts have been completely rewritten and the book is now up to date. The illustrations, increased from 37 to 57, retain both their excellence and usefulness. As might be expected more space is devoted to the use of selective weed killers. Seven appendices contain much sought after figures for routine computation work, Both those who have the earlier editions and others less fortunate will be wise to get this standard work.

3278. Duque, J. G.
Solo e água no polígono das sêcas. **(Soil and water in the dry polygon.)**
[*Publ.*] *Minist. Viaç. Obras publ., Dep. nac. Obras Secas* **154,** 3rd revised edit., 1953, 9×6½ in., pp. 306, bibl. 77, illus.

This book is concerned with the agricultural development of the arid polygon of territory comprising the districts of Caatinga, Sertão, Seridó, Agreste, Carrasco and Serras in the State of Bahia in Brazil. The author briefly discusses, pp. 101-34, the following "dry crops", all but one of which are indigenous: *Copernicia cerifera* (producer of carnauba wax), *Licania rigida* (oiticica oil), *Opuntia ficus* var. *indica inermis* (an introduced fodder plant), *Manihot* spp. (ceara-rubber yielding trees), *Cnidosculos phytacanthus* (edible oil seeds), *Neoglaziovia variegata* (producing caroa fibre similar to sisal), and *Spondias tuberosa* (edible fruit).

3279. Gardner, H. W., and Garner, H. V.
The use of lime in British agriculture.
Farmer and Stock-Breeder Publications, E. and F. N. Spon, London, 1953, 9×6 in., pp. 216, illus., 26s.

Only indirectly does this important book touch the horticulturist. He cannot, however, be indifferent to its contents especially to Chapters 5, 7, 8 and 9, which concern respectively pH and plant growth, losses of lime from the soil, liming materials, and the application of liming materials.

3280. Groven, I., and Christensen, H.
Oversigt over nogle af de for havebruget og gartneriet vigtigste resultater af Statens Forsøg i Plantekultur samt fra gartneri- og havebrugsorganisationernes forsøgsvirksomhed. **(Survey of the most important results obtained by the Danish horticultural research stations and other horticultural organizations.)**
Nielsen & Lydiche (M. Simmelklaer), Copenhagen, 1954, 8×6 in., pp. 95.

A survey is made of some 1,000 horticultural communications published as *Beretning* or *Meddelelser fra Statens Forsøgsvirksomhed i Plantekultur*, most of which appeared in *Tidsskr. Planteavl.* Another source of published experimental results also familiar to our readers and cited here is the Danish Yearbook of Horticulture (*Årbog for Gartneri*). The summarized work is presented in 6 chapters: I. Top fruit. II. Small fruit. III. Vegetables. IV. Weed control. V. Glasshouse trials. VI. Other trials and tests. The brochure concludes with a list of Danish research stations and other institutes and a full subject index.

3281. von Hofsten, C. G.
Studier över släktet Taraxacum *Wigg. med särskild hänsyn till gruppen* vulgaria DT *i Skandinavien.* **(Studies on the genus *Taraxacum* with special reference to the *vulgaria* group in Scandinavia.)** [English summary 22½ pp.]
LTs Förlag, Stockholm, 1954, 9⅜×7 in., pp. 432, bibl. 293.

This detailed study of the genus *Taraxacum* includes a discussion of dandelions as weeds and of the possible role of *Phoma taraxaci* in their control.

3282. International Botanical Congress, Stockholm (Osvald, H., and Åberg, E.).
Proceedings of the Seventh International Botanical Congress, Stockholm, July 12-20, 1950. Almqvist & Wiksell, Stockholm, and The Chronica Botanica Co., Waltham, Mass., U.S.A., 1953, pp. 899, Sw. kr. 90, £6 4s. or $17.35.

Excursions, meetings, discussions and numerous summarized papers are attractively presented in this large volume published by Chronica Botanica. The papers are collected in sections under headings, which include agronomy, cytology, experimental ecology, experimental taxonomy, genetics, morphology, mycology and bacteriology, nomenclature, phytopathology and plant physiology.

3283. Istituto di Frutticoltura e di Elettrogenetica, Roma.
Nuove uve da tavola italiane. **(New Italian table grapes.)**
Ist. Frutticoltura e di Elettrogenetica, Rome, 1951, 13×9 in., pp. 111, illus., Lire it. 1,000 [received 1954].

In 1949 the Italian Ministry of Agriculture entrusted the task of collecting, studying and publishing accounts of the different fruit varieties grown in Italy to the well-known institute at Grotta Rossa near Rome. The first publication resulting from this decision is that which deals with table grapes. Forty-seven crosses are described including some for which the following noted Italian viticulturists were responsible: Bogni, Dalmasso, Manzoni, Prosperi, and lastly and especially Pirovano, director of the station which publishes this work. Pirovano gives a brief account of his methods.

3284. Istituto di Frutticoltura e di Elettrogenetica, Roma.
Le nuove pesche Italiane. **(The new Italian peaches.)**
Ist. Frutticoltura e di Elettrogenetica, Rome, 1953, 14×10 in., pp. 49, incl. 22 col. pl., [price not stated].

The first work in this series concerned table grapes [see abstract 3283]. Short accounts are given of the aims of modern Italian peach breeders, viz. Capucci of Bologna, Morettini of Florence, Pirovano who is director of the institute issuing the series, and Pieri of Pistoia. They include suitability for particular climatic conditions, earliness, hardiness, productivity, capacity for transport, etc. For each of the crosses illustrated particulars are given of salient features. [The work and the results achieved would appear to be of considerable value to peach breeders outside Italy.]

3285. King, N. J., Mungomery, R. W., and Hughes, C. G.
Manual of cane-growing.
Angus & Robertson, Sydney and London, 1953, 9×6 in., pp. 349, bibl. in text, figs. 152, 63s.

By 1950 the production of sugar cane in Queensland had expanded to more than 6½ million tons of cane, nearly the whole of which was grown by small growers producing on average about 1,000 tons. Under conditions of relatively high labour costs and in the absence of the technical staff available under large plantation systems such growers "must, of necessity, possess a good working knowledge of all farm matters from land-clearing to harvesting the crop". It is for the small grower that this book has been written.

The authors are all members of the staff of the Queensland Bureau of Sugar Experiment Stations and are thus well qualified to describe and discuss the practical results of research work as well as the practices and experiences of a progressive and mechanically-minded body of growers.

The greater part of the book is by N. J. King, the Director of the Bureau. He opens with a brief general review of the industry and follows this with short accounts of the cane plant, the cane soils of Queensland and the nature and importance of the soil solution. The treatment thus far as sketchy, but thereafter he deals in greater detail with the following subjects: the problem of maintaining soil organic matter, notably by green manuring, under the system of pre-harvest burning; methods of bringing scrub land into cultivation; methods of planting and cultivating cane and machines developed for the purpose; the use of fertilizers, lime and mill by-products in the nutrition of cane; factors affecting the germination of setts; irrigation and drainage problems and practices; factors to be considered in, and machines used for, harvesting cane; the effects of frost, hail and wind damage; the chemical control of weeds; soil conservation practices; and finally cane varieties and cane-breeding methods.

Queensland is unfortunate in possessing nearly every known cane disease including at least one found nowhere else. Their symptoms are described by C. G. Hughes with the aid of many illustrations, some in colour. Vigorous quarantine and other control measures have already eradicated some of the more serious diseases and are now being applied against others, notably the recently recognized ratoon stunting disease. The story of the latter disease affords an example of the way in which even the most up-to-date book may, in these fast moving times, become out of date in some respects within a few months of its appearance. In 1953 the use of heat treatment to eradicate the disease in planting material was considered of doubtful commercial application; by 1954 the method was being widely applied on a large scale.

The pests of cane in Queensland are described by R. W. Mungomery. Again there is a lengthy list, with the soil inhabiting grubs of certain beetles very much to the fore. The development of effective control measures against these grubs based on soil applications of BHC makes an interesting story.

Although this readable book was written primarily for Queensland growers, it contains many features that should interest cane growers in other lands. The numerous photographs used to illustrate the text are mostly well chosen, though a few are rather indistinct. A subject index makes it easy to find specific information quickly. G.K.A.

3286. Kobel, F.
Lehrbuch des Obstbaus auf physiologischer Grundlage. **(Textbook of fruitgrowing—from a physiological standpoint.)**
Springer Verlag, Berlin–Göttingen–Heidelberg, 2nd edition, 1954, 10×7 in., pp. 348, illus., RM. 39.60.

Considerable additions have been made to the science of fruit-growing since Dr. Kobel first published his textbook in 1931 on the physiological principles underlying fruit-growing practice. The book is now brought up-to-date in a second edition, incorporating a comprehensive review of the relevant literature up to 1950. The division of the subject into—the general principles of fruit tree physiology—vegetative growth—blossom formation—fruit formation—the relationship between vegetative growth, blossoming and fruit formation—and the breeding of new varieties—remains substantially unaltered, though several sections have been completely re-written. The section on vegetative growth is new, and some parts, for instance those on mineral nutrition and juvenility have been greatly expanded.

It is the aim of the author to put before the student, the teacher, the research worker and the fruit grower the scientific facts and theories which rationalize, and occasionally modify, modern fruit-growing practice. This is a very considerable endeavour, since modern fruit-growing, in which Dr. Kobel includes plant breeding and fruit storage, covers nearly every aspect of plant growth. While the specialist in any particular field will perhaps not wholeheartedly agree with all the statements made, some measure of generalization is essential in a book of this kind, and the reader is given a very full account of the broad lines of research on all the more important problems concerning the growth of healthy fruit trees.

Dr. Kobel's attempt to make each section of this book self-contained has led to some degree of repetition and has resulted in a somewhat cumbersome arrangement of the references. A more serious criticism is that the endeavour to present impartially the results of many different research investigations occasionally leaves the reader without a clear picture of the salient factors. This is particularly so in the section concerned with the reciprocal effects of rootstock and scion. The choice of some of the examples has been unfortunate. For instance Czar on Common Plum, which is known to be an incompatible graft combination, is illustrated as an example of a dwarfing plum rootstock, while the swelling which occurs at the union of apple trees worked on M. IX is quoted as an example of incompatibility. In addition the text is, unfortunately, not free from mistakes which are irritating to the specialist and may mislead the general reader. To give only one example, the vigour of the new woolly aphid resistant rootstock MM. 106 is comparable to that of M. VII, and not to that of M. XII as stated in the book (p. 263).

In spite of these blemishes the book represents a very notable effort to collect and evaluate the ever-increasing volume of research relating to the growth of fruit trees, and there is at present no comparable book in English. The incidental information given on continental fruit-growing practice provides an additional interest to readers from other countries. B.M.

3287. Massee, A. M.
The pests of fruits and hops.
Crosby Lockwood & Son, London, 3rd edition, 1954, 8½×5½ in., pp. xvi+325, bibls., illus., 25s.

A book that reaches a third edition has proved its usefulness, and this can safely be said about Dr. Massee's handbook which has been revised and largely re-written. It is the grower's stand-by, though its format is too large for it to be described as his "vade-mecum". The whole is based on the author's observations during the last 30 years. Dr. Massee started his professional life with the definite intention of being a "fruit entomologist" (although, of course, his activities have been, and are, much wider than that) and has made the orchards of his adopted county his hunting-ground with occasional sorties into neighbouring areas. The hypercritical might say that this was a fault in the book, that it deals with local pests rather than those of the whole country, but the same may be said of Gilbert White and his *Natural History of Selbourne*, which succeeding generations of mankind have found readable, understandable and informative. The author, however, counteracts any parochial tendency by drawing, when necessary, on other writers and observers so that the book is made as complete as possible.

The main body of the work is well planned and logical. There are 12 chapters each devoted to an individual fruit crop; under each host is given a list of the pests attacking it, the more important being distinguished by heavy type; the insects are further subdivided into their orders. The loose plan for dealing with each insect is its effect on the host, the description and life history of the cause, the control, and an appended bibliography. All relevant information is succinctly given and just what the average person wants or is likely to remember. Two points in particular we like and welcome: the noting of the waxing and the waning of the pests throughout the years of the author's observations and his tentative explanation of these facts, and, secondly, the careful way instructions regarding control are given. Here is seen the expert personal touch of Dr. Massee who has done the work himself and is not relying on others for his information; his experience gives confidence to the user of this recommendation.

A very useful chapter on beneficial and harmless insects (using the word in its widest sense) serves to round off the subject. In time, no doubt, much more data on these will be forthcoming, and if they are not dealt with so fully as the pests in the previous chapters the notes should be sufficient to satisfy his readers' thirst for knowledge. We should not be inclined to support Dr. Massee when he includes amongst his list of predators the onion thrips and the psocid, *Stenopsocus*, although the status of the latter is modified in a later paragraph. Human ingenuity is shown in the remarks dealing with *Aphelinus mali* and its propagation.

Little need be said about some of the scientific names used, as views on nomenclature are largely individual. That applied to the mealy plum aphid, for instance, is taken from an anonymous, non-binominal work by Geoffroy, published in 1762, that has caused much confusion and controversy in entomology and upon which at long last the International Commission on Zoological Nomenclature has given guidance.

One of the best general accounts of insecticides used in orchard work we have read is that by Mr. R. P. Tew, who is to be congratulated on condensing so much in such little space; the chapter might with advantage be studied carefully by those whose knowledge of the newer insecticides does not go beyond the names which are picked up from advertisements.

The final chapter on Spraying Machinery by Mr. Geoffrey Fletcher takes the place of the one written by Mr. J. Turnbull in the previous editions, and is a thoughtful essay on a subject of paramount importance to the entomologist, chemical manufacturer and the engineer. F.L.

3288. RESEARCH COUNCIL OF ISRAEL.
Desert research, being **Proceedings International Symposium** held in Jerusalem, 7-14 May, 1952.
Spec. Publ. Res. Coun. Israel **2,** 1953, pp. 641, illus., I.L. 6,000 [approximately £2 10s.]

The meeting giving rise to 50 papers by the leading world experts on converting the desert to agriculture was organized by the Research Council of Israel in co-operation with the Department of Natural Sciences of UNESCO. Papers are classified as of a general and explanatory nature, or as concerned with particular problems of climate, biology, soils, or water and energy. Among titles of papers bound to interest many of our readers are the following: Dew gradients in relation to climate, soil and topography.—The effects of rain and temperature on plant distribution in the desert.—The water balance of plants in desert conditions.—Plant introduction [into Australia].—Chemical components of useful or potentially useful desert plants of North America and the industries derived from them.—Desert plants in Israel as potential sources of cellulose.—Some useful plants of therapeutic value from desert regions in Israel.—The utilization of wind power in desert areas. The gist of the discussions on each paper are recorded and included. Those whose work is in or near deserts or is connected therewith will find not only these but the other 42 papers and discussions of the greatest possible interest. D.A.

3289. RITTERSHAUSEN, P. R. C.
Successful orchid culture.
Collingridge, London, 1953, 9×5½ in., pp. 136, 15s.

The book is concerned with the cultivation of cool and intermediate house orchids in the private garden. Emphasis being on economy the extravagant requirements of stove orchids place them outside the scope of this work. After some preliminary words of encouragement, now a well-established ritual in books addressed to the amateur, pointing out how terribly easy it all is when you know how, the author starts us off from scratch with the adaptation or construction of the greenhouse, in the latter case complete from footings to roof. At this point those who cannot see themselves in the multiple role of bricklayer, carpenter, plumber and glazier may be tempted to present the book to someone who does. This would be a pity, because the chapters which follow should prove uncommonly useful to the orchid-minded. Really orchids are very accommodating plants. True, they dislike draughts, but who doesn't? In other respects they are quite long-suffering and, contrary to general belief, their cultural needs are extremely simple. There are many more difficult subjects and in fact most orchids will thrive in any normally run greenhouse. Part 1 deals with routine management, propagation, hybridization, pests and diseases. The modern commercial flask method of raising seedlings in thousands, entailing highly scientific laboratory treatment, is omitted, but two older methods by which satisfactory germination can be obtained are described in detail. Parts 2 and 3 deal with cool and intermediate houses respectively with notes on suitable varieties. There are some good illustrations and an index. Here is a simply written manual which, in these days when every man is his own gardener, should be sure of a welcome.
G.St.C.F.

3290. SMITH, A. M.
Manures and fertilisers.
Nelson, London, 1952, 7½×5 in., pp. 275, bibl. 24, illus., 15s.

This compact, small book is addressed primarily to the student and to the grower and the author's pleasantly limpid style should help to make it of the greatest help to both. A casual dip reveals also its value as a guide for the research worker even despite the absence of references to original papers. Separate chapters concern nutrition of the plant, organic matter and farmyard manure, bulky organics and waste products, liming, fertilizers containing nitrogen, ditto phosphorus, ditto potassium, the trace elements and growth substances, utilization of fertilizers, sale of fertilizers, and residual values.

3291. U.S. DEPARTMENT OF AGRICULTURE.
Plant diseases, being *Yearbook of Agriculture 1953.* Supt. Documents, Washington, D.C., 9×6½ in., pp. 940, bibls, coloured plates and line drawings, $2.50.

Since 1936 each volume of the Yearbook of the U.S. Department of Agriculture has been devoted to reviewing progress in a single field of agricultural science. The present large volume on diseases, embracing those caused by nematodes, parasitic plants and physiological factors as well as by fungi, bacteria and viruses, contains articles on many subjects of interest to horticulturists. These include economic aspects, developments in fungicides, soil fumigation, seed treatments, raising virus-free fruit stocks, breeding for resistance, and post-harvest diseases. The control of one or more diseases is described for the following crops: *Vegetables:* beans, peas, celery, lettuce, brassicas, onions, tomatoes, peppers, beets, carrots, spinach, cucurbits and mushrooms. *Sugar cane. Tobacco. Ornamentals:* snapdragons, asters, azaleas, carnations, chrysanthemums, gladioli, lilies, tulips, narcissi and roses. *Fruits and nuts:* apples, pears, peaches, cherries, apricots, almonds, citrus, avocadoes, grapes, strawberries, blueberries, cranberries, pecans, filberts and walnuts. Among miscellaneous plants receiving attention are house plants, herbs, and coffee in tropical America. The book is furnished with a subject index and rounded off with 32 handsome coloured plates, most of which illustrate 4 separate diseases.

3292. Verona, O.
Malattie nutrizionali delle piante coltivate. **(Nutritional diseases of cultivated plants.)**
Edizioni Agricole Bologna, 3rd edition, 1953, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 207, illus., lire it. 1,300.

This small book with its 10 elegant coloured plates and numerous other illustrations, its separate author and subject indexes and its appendix, in which the different deficiency symptoms are described in cereals, potatoes, tomatoes, tobacco, sugarbeet, cauliflower, deciduous fruit plants and citrus, tells the story for the Italian reader such as has been told by Wallace for the English. The only fault that one can find with it is perhaps the fact that although authorities are quoted for nearly every statement, particular references are not cited in full. D.A.

3293. Wallace, T., and Martin, J. T. (Editors).
Insecticides and colonial agricultural development, being *Proceedings of the 6th Symposium of the Colston Research Society,* University of Bristol, 1953.
Butterworths Scientific Publications, London, 1954, 10×7 in., pp. x+169, 30s.

This is the full report of a Symposium promoted by the Colston Research Society. As stated in the preface, the objective was to review the progress made in the Colonial Territories, lying mainly in the tropics, with the newer insecticides and spraying techniques. The six sessions were devoted to pest control in crops (4) and in livestock (1) and to machinery and chemical manufacturing problems (1), and discussion followed the lectures in each session. The contributions reached a high standard of information and presentation throughout and anyone concerned with, or interested in, food production in the Colonies will be well repaid by study of this timely volume.

Clearly, the immense developments by the chemical industry in the post-war years, which have led to such achievements in pest and disease control in temperate areas of the world, have overflowed into these tropical areas where other, more basic, developments are conspicuous by their absence. The results have been very uneven and often confusing. Attempts have been made to control insects in one area merely because they are known to be pests in other areas where cultural practices are quite different, and not because research had shown the need for insecticides. Moreover, the research man-power has been, and in most areas remains, so inadequate that insecticide programmes have been based only on the known toxicity to a given pest instead of on the results of studies involving the general effects of such applications. Such an approach to chemical methods of pest control is not confined to the Colonies and has had repercussions of an alarming sort in more developed countries. One cannot help feeling that even more care is required under conditions where violent fluctuations of insect populations, so notorious in locusts for example, can occur.

The problems involved in application of chemicals are in some ways more difficult than those of the chemicals themselves. The great differences in terrain as well as in cultural methods, from primitive native to optimistic "white man", call for many types of machinery, and it is clear that developments in pest control in the Colonies, as elsewhere, must often await developments on a much wider front.

The Colston R. S. and all those who organized this Symposium are to be congratulated on focusing attention on this aspect of a vast and complex subject of such importance to human welfare and peace.
A.H.M.K.

3294. Witte, K.
Untersuchungen über den Einfluss erhöhter Luft- und Bodenfeuchte auf den Pflanzenertrag. **(The effect of increased air humidity and soil moisture on plant yields.)**
Verlag Wasser u. Boden, Hamburg, 1952, $8\frac{1}{2} \times 6$ in., pp. 148, bibl. 39, illus., being *Schriftenreihe Ausschuss. Kulturbauwesen in Westdeutschland,* Heft **1** [received 1954].

In 1939 a sprinkler irrigation plant was installed at Marhof, the agricultural experiment station of Bonn University, with the object of demonstrating model practices to the growers in the less favoured vegetable areas of the district. It was soon realized, however, that many of the important technical and cultural problems involved had not been studied scientifically and that certain fundamental doctrines then held lacked experimental proof. There was one school of thought, for instance, which considered the reduction of transpiration losses the chief aim of irrigation in opposition to the customary view that the plants are best helped by replenishing the soil moisture. Hence the author, instead of being able to advise others, was forced to make his own contribution to building up the new science of irrigation. The book is an account of his first 3 years' experiments (1949-1951) and of his extensive tests of the latest sprinklers and nozzles developed in Germany.

The following are among the results obtained: In most cases irrigation at night gave higher yields than irrigation during the day. At times, however, especially before and after transplanting, the increase in air humidity resulting from irrigation during the hot and dry hours of the day proved very beneficial. But the advantage gained from a rise in relative humidity is often more than offset by a drop in temperature if water applications exceed 1 mm. per hour. A uniform application of this order has been made possible by the use of very fine nozzles and the automatic interruption of the water supply at short intervals. For the purpose of increasing soil moisture, irrigation during the day was found to be wasteful and less economical.

Experiments were also carried out in the glasshouse to define the optimum relationship between relative humidity and temperature for cucumbers and other crops. The author deals in turn with field trials in 1949 and 1950, glasshouse trials in 1950 and field trials in 1951. No one interested in the problems of sprinkler irrigation can fail to be stimulated by this discussion of investigations. V.H.G.

Reports.

3295. Agassiz.
Progress Report Dominion Experimental Farm, Agassiz, British Columbia, 1948-52,
1954, pp. 38, illus.

The facilities of the Horticulture division have been expanded during the period under review to include a laboratory for fruit and vegetable testing, cold storage space, specialized machinery and additional acreage for experimental plots. Notes are given on tested or promising small fruit and vegetable varieties, weed control in some of these crops and the use of herbicides in ornamental horticulture and mulching vegetables with sawdust.

3296. AGRICULTURAL RESEARCH COUNCIL.
Index of agricultural research in progress during 1953-4.
H.M.S.O., London, 1954, pp. 118, 5s.

Last published in 1951 this index has been enlarged and revised, not only to include new work, but also in accordance with suggestions made by readers of the first edition. It now covers practically all state-aided agricultural research financed by the A.R.C., the Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland. It includes the long-term experiments of the Experimental Husbandry Farms and Horticulture Stations and the field experiments of the N.A.A.S. and the investigations of the Scottish Agricultural Colleges.

3297. BEAVERLODGE.
Progress Report Dominion Experimental Station, Beaverlodge, Alberta, 1948-52, 1954, pp. 44, illus.

Varieties and species of ornamentals, fruits and vegetables showing outstanding performance or particular promise during the period covered by this report, when weather conditions were more rigorous than normal, are listed.

3298. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM.
Bundesanstalt für Qualitätsforschung pflanzlicher Erzeugnisse, Geisenheim/Rheingau. Tätigkeitsbericht 1. April 1953—31. März 1954. (**Annual Report of the Federal Institute for Quality Research on Plant Products, Geisenheim, 1 April, 1953, to 31 March, 1954,** 1954, pp. 30, bibl. 11, illus.

For a note on the object of the new institute see *H.A.*, 23: 4745. Work in progress includes the following subjects: The apple as a source of vitamin C, the effect of manuring on the composition of fruit, valuable constituents of cauliflower, frost and ascorbic acid content, and lastly valuable constituents and flavour of cabbage varieties. [See also separate abstracts.]

3299. CUNENE (MIRRADO, J. H. M.).
Posto de ensaios do Cunene. Relatório técnico do ano de 1950, 1951, 1952. **(Cunene Experiment Station. Technical Reports for the years 1950, 1951 and 1952.)**
Agron. angol., 1953, No. 8, pp. 47-72, 73-94, 95-149.

In 1949 it was decided to examine the possibilities of European colonization in the Cunene valley in Angola. No. 8, 1953, of *Agronomia Angolana* is devoted to a historical account of the project and to technical reports under the general title "Contribution to the agricultural study of the Cunene valley". An experimental station was set up near Humbe (1950/51 rainfall 730 mm. in October/May). Crops under examination include tung, sisal, ramie, sugar cane (P.O.J. 2728 and P.O.J. 2878), arabica coffee, tobacco (best varieties Jamaica, Lola and Hickory Pryor), bananas, papaws, citrus and other fruits, and vegetables.

3300. INDIAN AGRICULTURAL RESEARCH INSTITUTE, NEW DELHI.
Scientific Reports of the Indian Agricultural Research Institute for the year ended 30th June, 1951, 1953, pp. 120.

Agronomy. Cane: cultural and manuring trial. Tobacco: varietal trial. *Botany.* Breeding: safflower, peppers, *Nicotiana rustica*, tomatoes. *Chemistry.* Availability of nitrogen in tea waste. Minor element deficiencies in citrus. Tomato biochemical studies. Mango kernel utilization. Quantitative estimation of nicotine by absorption spectrography. *Entomology.* Breeding of *Bracon gelechiae*, a potential parasite of the sugar cane borer. Studies on *Trialeurodes ricini* (the white fly vector of castor leaf curl), *Rhopalosiphum pseudobrassicae* on mustard, and on fruit flies (*Didacus ciliatus* and *Chaetodacus cucurbitae*). *Mycology and pathology.* Sugar cane: red rot, smut, breeding for resistance to these diseases, a new *Sphacelotheca* smut, rust. Soft rot of fruit and vegetables. Virus diseases: bottle gourd, tomato.

3301. INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE.
Travaux effectués par les stations agronomiques en 1952. **(Investigations made at Research Stations in 1952.)**
Ann. agron. Sér. A, 1953, **4**: 801-1019.

Physiology. Mineral nutrition of vine, apple, lupin, rose and cherry. *Biochemistry.* Maturation and assessment of maturity in grapes. *Nutrition.* Crops studied included vine (nitrogen, phosphorus, potassium, calcium), apple (magnesium deficiency), gladiolus (copper toxicity), hydrangea (colour change), vegetables (copper, boron), pear (toxicity of soluble salts). *Mushroom growing.*

3302. JOHN INNES.
44th Annual Report of John Innes Horticultural Institution 1953, 1954, pp. 35, 3s.

Pomology Department: Notes are given on fruit breeding, apple mildew resistance, strawberry trials and June yellows in strawberries, blackberry breeding, biometrical characters in raspberries, pear-apple hybrids and disease resistance in tomatoes. *Genetics Department:* Studies are reported on environment-genotype interactions, tolerance to poison in *Drosophila*, germination of stored seed, flower pigments, incompatibility, and cherry and tomato breeding. *Cytology Department:* Studies are reported on chromosome breakage and fruit cytology. *Garden Research Department:* Glasshouse climate; temperature and tomato flowering; steam sterilization; and methods of raising plants. *Rose Collections:* Hybridization, and germination in *Rosa*. [See also separate abstracts.]

3303. KENYA.
Annual report of Kenya Department of Agriculture for 1953, Part II, ***Research and Specialist Services,*** (Advance copy), pp. 28, typescript.

Coffee: biological control of *Planococcus kenyae*;

control of *Pheidole punctulata*, the mealybug attendant ant; tractor-mounted rotary hoe tests; analysis of Napier grass grown for mulching coffee; investigations on anti-leaf-fall spraying, and on coffee berry disease. *Pyrethrum:* production of improved strains; control of bud disease (*Ramularia bellunensis*); manurial trials. *Sisal:* fertilizer, spacing/cutting and cultivation trials; sodium trichloracetate as a pre-emergence spray controlled couch (*Digitaria scalarium*) fairly successfully. *Sugar:* variety trials; fertilizer trials and herbicide studies. *Horticulture:* temperate fruits and vegetables at Molo, including an observational apple rootstock trial under irrigation and under dry land conditions, tropical and sub-tropical fruits at Matuga and sub-stations, pineapples at Thika and on the coast; investigations into granulation of citrus fruits.

3304. KESTEREN.
Verslagen van de stichting "Boom en Vrucht" te Opheusden en het Rijkstuinbouw-consulentschap Kesteren over de jaren 1951-1952 en enkele voorloopige mededelingen over 1953. **(Reports for 1951 and 1952 and preliminary communications for 1953 on the Tree and Fruit Institute Opheusden and the State Horticultural Advisory Service in Kesteren),** 1954, pp. 150.

At Kesteren and Opheusden, Holland, research work is closely connected with the education and advisory services, thus the reports are largely concerned with the testing and demonstration of varieties. In the tree nursery section experiments have shown that black lime cuttings root most readily in peat; and that with autumn grafting of oak using *Quercus robur* as rootstock, and *Q. robur, fastigiata* and *frainetto* as scions, about 50% of the grafts were successful. In the fruit section experiments are being made on manuring of apples and red currants, cherry quality, soil sterilization for soil sickness, control of scab on apples, hormone sprays for pre-harvest fruit drop, and gas storage of apples. Further experiments are concerned with tomato manuring and the effect of soils on cucumber yield.

3305. THE MACAULAY INSTITUTE FOR SOIL RESEARCH.
Annual Report of the Macaulay Institute for Soil Research for 1952-1953, Craigiebuckler, Aberdeen, pp. 56, illus.

Plant physiology: phosphate absorption, nickel toxicity, June yellows in Auchincruive Climax strawberries, determination of calcium in plants.

3306. MCDONALD'S CORNER.
Progress Report Dominion Horticultural Substation, McDonald's Corner, New Brunswick, 1947-1952, 1954, pp. 14, illus.

The purpose of this new sub-station, opened in 1947, is to advance horticultural research in the Grand Lake, Maugerville-Sheffield, Jemseg, Belleisle and Washademoak areas of New Brunswick, where large bodies of water influence the climate and where there are soils particularly suitable for small fruit and vegetable culture. Large strawberry cultural trials are already established [see also abstract 2330], as are vegetable, bush fruit and top fruit variety trials.

3307. MAURITIUS.
Annual Report of the Mauritius Department of Agriculture for 1952, 1953, pp. 53, 75 cents.

Sugar cane; fibre (*Furcraea* and sisal); tobacco seed production, variety trials, breeding and selection for resistance to black shank, crop rotations; and tea. [See abstract 3237 on pests of sugar cane.]

3308. MISSISSIPPI.
66th Annual Report Mississippi Agricultural Experiment Station for year ending June 30, 1953, pp. 110, illus. [received 1954].

Horticulture: Studies on peach, strawberry, raspberry, grape, apple and pear. Variety trials with snap and lima beans; applications of growth substances to retard and to induce bolting in cabbage; tomato and cucumber breeding; seed storage investigations. Chrysanthemum, carnation, poinsettia, rose, camellia and ornamental nursery stock studies. *Plant pathology and physiology:* Breeding fusarium- and anthracnose-resistant watermelons and cantaloupes, and virus-resistant peppers. Studies on camellia and azalea diseases. Weed control in vegetables and control of specific weeds.

3309. MISSOURI.
Agricultural research builds up new efficiency in farming.
Annual Report of the Missouri Agricultural Experiment Station 1950-51, being *Bull.* **584**, pp. 138, illus.

Horticulture: Vegetable breeding, irrigation, nutrition; fruit thinning, prevention of pre-harvest drop, disease control; weed control; marketing. *Botany:* Studies on fusarium resistance in tomato hybrids, virus diseases of stone fruits. *Entomology:* Control of some fruit and vegetable pests.

3310. NYASALAND PROTECTORATE.
Annual Report of the Department of Agriculture for the years 1952 and 1953, Part II, 1954, pp. 34, 5s.

Dark-fired and flue-cured tobacco. Variety, fertilizer and cultural-and-fertilizer trials. *Oil seeds.* Castor, safflower. *Tea.* Nursery practices, establishment, pruning, tipping, plucking, manuring, spacing, weeds and weeding, permanent shading. *Tung.* Budding *v.* seedlings, clonal trials, intercropping and cover crops, fertilizers, diseases and pests. *Fruit* (Mwera Hill Experiment Station). Citrus, temperate fruits (stone, pome, small), fig, vine, olive, guava, walnut. [See separate abstracts on tobacco, tea and tung.]

3311. PALMIRA.
Memoria Estación agricola experimental de Palmira. **(Annual report of the Palmira agricultural experimental station for 1952),** Palmira, Colombia, 1953, pp. 113, illus.

Sugar cane: breeding and selection, variety trial. *Various crops:* french bean, castor. *Plant pathology:* rayadilla disease of banana, raising banana from seed. *Horticulture:* tomato trials. *Cacao:* selection, vegetative propagation, floral studies, organic manures, mineral fertilizers applied as leaf sprays, fermentation, disease control.

3312. SUDAN.

Annual Report of the Research Division, Ministry of Agriculture, Sudan, 1950/51, 1953, pp. 187, map.

This report is almost entirely devoted to cotton but includes accounts of work on some other crops and weed control. *Agronomy and Plant Physiology:* experiments with castor, safflower and tobacco as alternative cash crops (to cotton) for the Gezira. *Botany and Plant Pathology:* control of *Cyperus rotundus* and of water weeds [see separate abstract]. *Entomology:* experimental control of insect pests on vegetables. *Yambio Experimental Farm:* castor.

3313. TRINIDAD AND TOBAGO.

Administration Report of the Director of Agriculture, Trinidad and Tobago, for 1952, 1953, pp. 65.

Cacao: clonal and fertilizer trials; propagation methods; breeding of witches' broom resistant clones. *Sugar cane:* varietal and manuring trials. *Citrus:* seedling lime disease investigations. *Coconuts:* red ring disease; bronze leaf wilt and a number of minor diseases.

3314. MARAIS, J. S.

Winter-rainfall region, [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1953.]

Fmg S. Afr., 1954, **29**: 94-7, 123.

The report of the Stellenbosch-Elsenburg College of Agriculture on education, extension work and research in the winter-rainfall region, includes notes on cultivation and fertilizer experiments on vines, vine propagation, vineyard pests, vegetable pests and diseases, and tomato viruses.

3315. NAUDE, T. J.

Entomology. [Forming part of the Annual Report of the Secterary for Agriculture, Union of S. Africa, for the year ending 31 August, 1953.]

Fmg S. Afr., 1954, **29**: 44-7, 80.

In this survey of work done in 1952/53 by the Division of Entomology, South Africa, the following are discussed: insecticides, biological control of insects, and pests of citrus, deciduous fruits, pineapple and tobacco.

3316. SAUNDERS, A. R.

Natal Region. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1953.]

Fmg S. Afr., 1954, **29**: 119-23.

In the horticulture section of this report on education and research in Natal, the following are among results recorded: By splice grafting avocadoes, trees were ready for planting out one year after planting the seed. Smooth Cayenne pineapples gave 4 times the yield given by the Queen variety. Onions, var. Texas Grano, gave higher yields under a paper mulch.

3317. WEST OF SCOTLAND AGRICULTURAL COLLEGE.

Report on the work of the College for the year ended 30th September 1953, Glasgow, 1953, pp. 59.

Tomato trials: continuous liquid feeding through trickle irrigation, studies on the concentration of fertilizers for plants grown under mercury vapour lamps, the breeding of disease-resistant varieties. *Plant pathology:* disorders of beans, the nutritional status of plants in relation to disease.

New or revived periodicals.

3318. CENTRALE PROEFSTATIONS VERENIGING, INDONESIA.

Archives of Rubber Cultivation [*Arch. Rubb. Cult.*], 1954, Vol. 31, No. 1, pp. 46, illus., C.P.V., Teromolpos 706, Djakarta-Kota.

This journal is a continuation of the Dutch *Archief voor de Rubbercultuur*, but it is now published in English. The articles have Dutch and Indonesian summaries. It is to be published at irregular intervals by the Central Association of Experiment Stations (C.P.V.), in collaboration with the General Organization of Rubber Planters in East Sumatra (A.V.R.O.S.) and the Foundation Indonesian Rubber Research Institute (I.N.I.R.O.). The issues will be priced separately according to their cost of printing.

3319. SOCIÉTÉ POMOLOGIQUE DE FRANCE.

L'arboriculture fruitière. [*Arboric. fruit.*], No. 1, 1954, pp. 24, illus., 1,800 fr. p.a. from 61-63 avenue Ledru-Rollin, Paris (XII^e).

This monthly journal replaces *La Pomologie française* (which has ceased publication) as the organ of the Société Pomologique de France. Its aim is to report new techniques and processes. The first number contains further information by M. Renaud on his new method of training and pruning deciduous fruit trees [see *H.A.*, 23: 2630 and abstract 2298 above] and articles on dormant spraying, late frost control [reprinted—see *H.A.*, 24: 1312], aphid control, the systematization of work in fruit growing, and a list of apple varieties recommended for different parts of France by the Conseil Supérieure de l'Agriculture.

3320. PALMIRA. CAMPAÑA NACIONAL DE CACAO.

Cacao en Colombia. (*Cacao in Colomb.*), Vol. I, 1952, pp. 119, and Vol. II, 1953, pp. 189, Oficina Central, Campaña Nacional de Cacao, Estación Agricola Experimental, Palmira, Colombia, [price not stated].

This new illustrated annual is the official journal of the Campaña Nacional de Cacao, a department of the Colombia Ministry of Agriculture and Animal Husbandry. Each issue contains about a dozen research notes, some of them with English summaries. At the end of Vol. I there are advisory notes on the cultivation of cacao. [See separate abstracts of the research notes.]

3321. THE COMMERCIAL GROWER.

Mechanisation in horticulture [*Mech. Hort.*], Spring 1954, pp. 21-72, illus., The Commercial Grower, 154 Fleet Street, London, E.C.4, issued free to subscribers to the *Commercial Grower* or as a separate, price 1s.

This publication is included among new periodicals in the hope that it will not prove to be merely a stray supplement to the present journal but will in fact become a regular addition to horticultural literature. No one, whether he be scientist, advisory officer or grower, can today afford to ignore the striking contributions to progress made possible by the engineer. So far as horticulture in Britain is concerned there is a real need for a journal devoted to objective and factual accounts of what machines and other devices may reasonably be expected to do to increase production and reduce costs. The present issue of *Mechanisation in horticulture* contains articles by a number of well-known contributors on the following, among other, subjects:—Practical aspects of horticultural labour saving, by L. G. Bennett; current progress with light irradiation of glasshouse crops, by D. Vince; an account of temperature controlled stores and their utilization, by H. W. Abbiss; mechanized aids in packing houses, by G. W. Stewart; the need for, and value of, irrigation, by S. A. Searle; modern glasshouse techniques and trends, by G. F. Sheard; aspects of mechanized cultivation, by E. R. Hoare; efficiency and thermostatic control in boiler heating, by J. S. Hales and D. C. Gunn; uses of electricity in horticulture, by A. W. Gray; and the use of artificial light in sheds to force bulb flower crops, by W. G. C. Krause.

3322. CONSEIL DES ACADEMIES DE LA R.P.F. DE YOUGOSLAVIE.
Bulletin scientifique [*Bull. sci. Cons. Acad. Yugosl.*], Tome 1, No. 1, 1953, 11½×8 in., pp. 32, obtainable from Institut de Physique "J. Stefan", Académie Slovène des Sciences et des Beaux Arts, Ljubljana, [price not stated].

The new Bulletin, a quarterly journal with papers in English, French and German, has the dual purpose of acquainting the Western world with scientific progress in Jugoslavia and of offering Jugoslav scientists a medium for early publication of notes on their results. Several papers in the first three numbers received have a bearing on horticulture and abstracts of them appear in this number of *Horticultural Abstracts*.

Noted.

3323.

a ARIZONA.
Annual Report of the Arizona Agricultural Experiment Station, 1952/53, 1953, pp. 15.
An inventory of research projects and recent publications is given.

b BASUTOLAND.
Annual Report of the Basutoland Department of Agriculture, 1953, 1954, pp. 63, illus.

c BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE.
Agricultural Statistics Report Year 1952, 1953, pp. 52.

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